# Service Electronics (Gen. 3)

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# Handling Boards

## ESD protection

CAUTION! - The boards can be destroyed by static discharge!

➜ Before opening the printer, place it on a grounded surface.
➜ Earth your body using an ESD bracelet or other suitable means, before touching a board. If no suitable ESD protection is available, touch an earthed object, e.g. a heating radiator, before touching a board.
➜ Only place boards on earthed surfaces.

## Handling

CAUTION! - The conducting tracks on the boards are very thin. If a board is bent or warped, the conducting tracks can easily crack.

➜ Avoid bending or warping boards.
➜ Avoid the use of excessive force when removing or inserting boards.

## Setting the imprint position

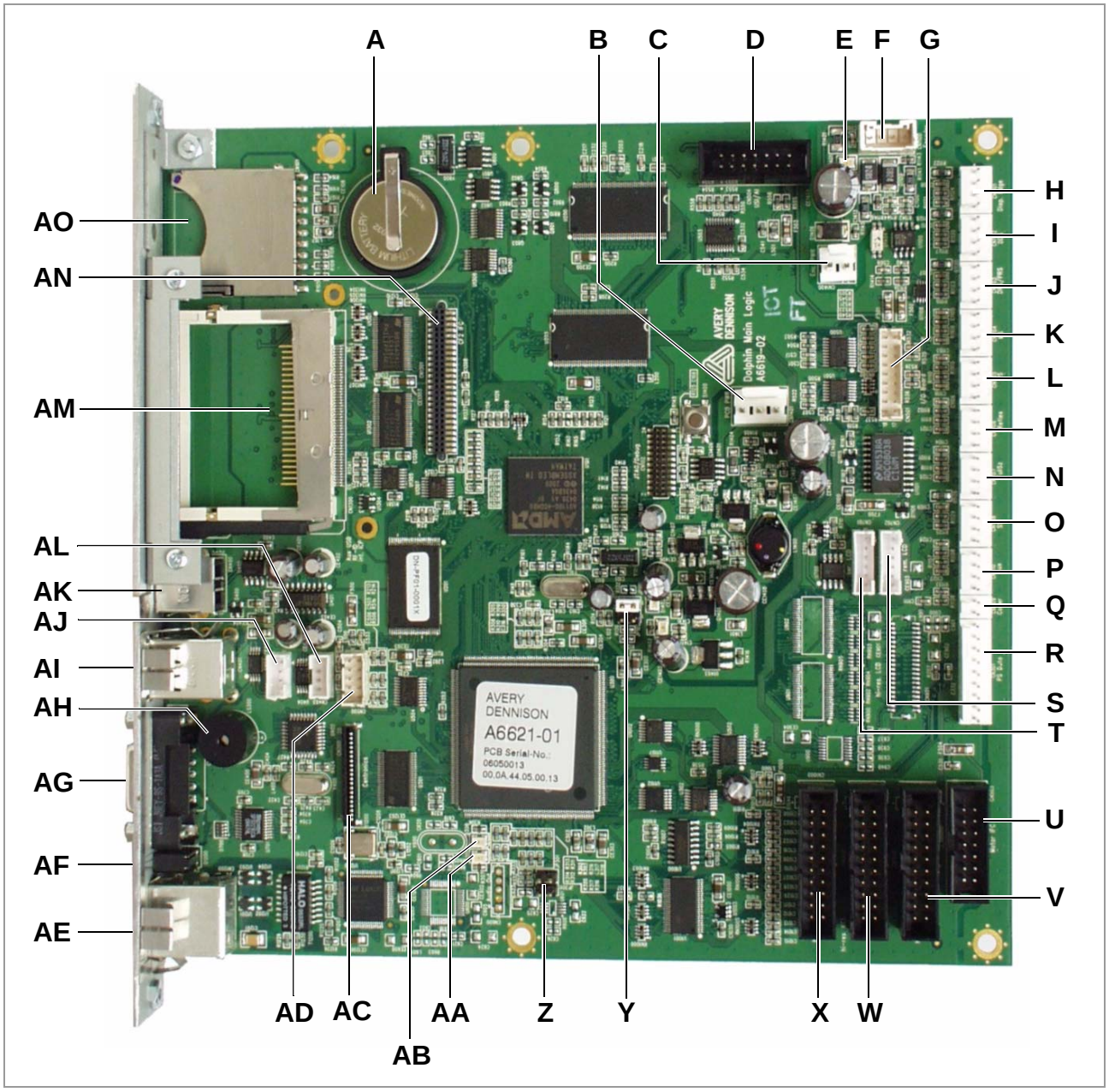
When printing on very long labels, it may happen that the imprint position has to be set. To do this, proceed as follows:

**Preconditions**

- DRUCK PARAMETER > Stanzen Offset = „0 mm“.
- DRUCK PARAMETER > Druckausrichtung = „Fuß voraus“.
- Erforderliches Etikettenmaterial: Mindestlänge 100 mm, ideal sind 200 mm.
- Drucker befindet sich im Produktions-Modus.

# CPU Board

View




*[1] CPU board (A6621).*

CAUTION!

If replacing the CPU board, mind the following to avoid malfunctioning:

➜ Only operate printers with a board index of -05 [a] with a firmware version of 6.33 or higher!

*a) CPU boards with index -05 were built-in starting with serial number 082566 0911.*

**A** Battery for realtime-clock (Lithium 3V, CR2032)
➠ Check the battery regularly and replace it if necessary!

WARNING!

Danger of explosion, if the battery is incorrectly replaced!

➜ Read and take notice of the notes in chapter Lithium Battery on page 7!

**B** CN 1401: Connection Power Supply
Voltage supply of the board with 5 V

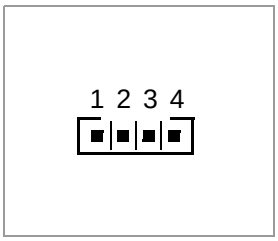
**C** CN 1400: Connection Power Supply
Voltage supply of the board with 24 V

**D** CN 504: Connection signal interface (USI) or applicator interface (AI)

**E** D 1401: LED indicating 24 V supply voltage

**F** CN 1100: Connection rotary encoder for automatic speed adaption (APSF sensor)

| Pin | Signal |
|---|---|
| 1 | +24 V |
| 2 | Impulse B |
| 3 | GND |
| 4 | Impulse A |




**G** CN 501: Connection I/O board

**H** CN 1101: Connection dispensing edge sensor; Cable marking = OS
Pin assignment see chapter Sensor connections on page 9

**I** CN 1102: Connection backing paper rewinder sensor (Ø-control); Cable marking = DDS
Pin assignment see chapter Sensor connections on page 9

**J** CN 1103: Connection feed roller sensor
- DPM, PEM, PM 3000, ALX: Cable marking = TS
- 64-xx Dispenser: Cable marking = DRS
- Pin assignment see chapter Sensor connections on page 9

**K** CN 1104: Connection material end sensor
- Cable marking = MS
- Pin assignment see chapter Sensor connections on page 9

**L** CN 1105: Light transmission label sensor; Cable marking = PS
Pin assignment see chapter Sensor connections on page 9

**M** CN 1106: Reflex label sensor; Cable marking = RS
Pin assignment see chapter Sensor connections on page 9

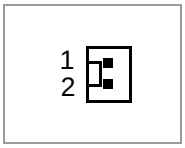
**N** CN 1107: Fullsize transmission label sensor; Cable marking = FSS
Pin assignment see chapter Sensor connections on page 9

**O** CN 1108: Singlestart sensor; Cable marking = SSS
Pin assignment see chapter Sensor connections on page 9

**P** CN 1110: Connection for auxiliary sensor (reserved)
Pin assignment see chapter Sensor connections on page 9

**Q** CN 1109: Cover switch; Cable marking = COS

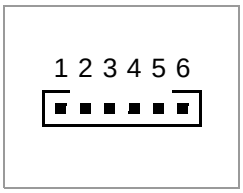
| Pin | Signal |
|---|---|
| 1 | Signal cover switch |
| 2 | GND |




**R** CN 301: Connection data cable power supply

**S** CN 702: Internal connection RS 485 operating panel

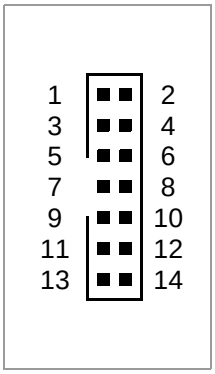
| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | +5 V | 4 | GND |
| 2 | Rx + | 5 | Tx + |
| 3 | Rx – | 6 | Tx – |




**T** CN 701: Connection external RS 485 operating panel
Pin assignment see CN 702 (S)

**U** CN 503: Connectioin motor output stages ($I^2C$ bus)

| Pin | Signal | Pin | Signal |
|---|---|---|---|
| 1 | Matmotor_CLK | 8 | GND |
| 2 | Foilmotor_CLK | 9 | Ext_SCL |
| 3 | Matmotor CW/CCW | 10 | Ext_SDA |
| 4 | Foilmotor CW/CCW | 11 | FPGA_nReset |
| 5 | PWM_Ctrl | 12 | V5_MTIF |
| 6 | Perimotor_CLK | 13 | GND |
| 7 | Rewinder_Ctrl | 14 | GND |




**V** CN 1002: Connection printhead (KCE)

**W** CN 1001: Connection printhead (KCE high resolution); reserved

**X** CN 1000: Connection printhead (KPA)

**Y** JP 101, JP 102: JTAG jumper
- Only for factory-internal use
- Default setting: JP 101 connected, JP 102 open

**Z** JP 300, JP 301: Software debug jumper
- Only for factory-internal use
- Default setting: both jumpers open

**AA** D 301: Software debug LED
Only for factory-internal use

**AB** D 300: Software debug LED
Only for factory-internal use

**AC** CN 300: Connection Centronics daughter board

**AD** CN 500: Connection RFID read/write unit

**AE** CN 1200: Connection Ethernet 10/100 Base T
Pin assignment see chapter Data interfaces at the mounting plate on page 8

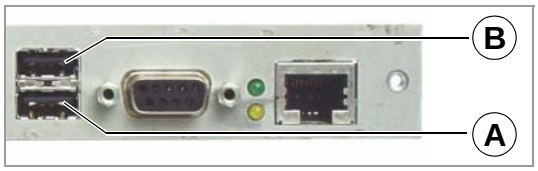
**AF** D 1200: Ethernet status LED:

| LED | Meaning |
|---|---|
| Green | *Continuously lit*: High transfer rate (100 Mbit/s) |
| Yellow | *Continuously lit*: Device is connected with the network<br>*Flashing*: Communication with network |

**AG** CN 703: Serial interface RS 232
Pin assignment see chapter Data interfaces at the mounting plate 🗋 on page 8

**AH** LS 300: Audible signal generator

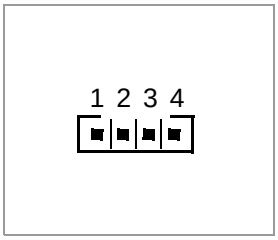
**AI** CN 401: USB interface (type A, host)
- Keyboard connection [2A]
- Inter Connect Port (ICP) [2B]; Connection to a dispenser main board
- Pin assignment see chapter Data interfaces at the mounting plate 🗋 on page 8




*[2] Position of the two USB host interfaces.*

**AJ** CN 402: Internal USB interface (host), parallel to CN 401

| Pin | Signal |
|---|---|
| 1 | +5 V |
| 2 | D – |
| 3 | D + |
| 4 | GND |




**AK** CN 400: USB interface (type B, device)
Pin assignment see chapter Data interfaces at the mounting plate 🗋 on page 8

**AL** CN 403: USB interface (host); reserved
Pin assignment see CN 402

**AM** CN 1300: CF-card slot
List of suitable CF-cards: see Plug-in card manual 🗋, topic section „Card types“, „CompactFlash card“

**AN** CN 1301: Interface for optional second CF-card slot
See Abschnitt CF daughter board 🗋 auf Seite 11.

**AO** CN 101: SD/MMC-card slot

## Lithium Battery

The CPU board is equipped with a realtime clock, which keeps its setting, if the printer is switched off. This is done by a lithium battery on the board.

➠ The battery is *not rechargeable*!
➠ The battery must be UL-listed!

**Battery type**

Panasonic CR2032 or an equivalent battery type.

WARNING!

Danger of explosion if battery is incorrectly replaced.

➜ Replace only with the same or equivalent type recommended by the manufacturer.
➜ Take care of the correct polarity when replacing the battery.
➜ Discard used batteries according to the manufacturer´s instructions.

AVERTISSEMENT!

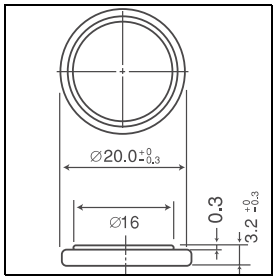
Il y a danger d´explosion s´il y a remplacement incorrect de la batterie.

➜ Remplacer uniquement avec une batterie du même type ou d´un type recommendé par le constructeur.
➜ Mettre au rébut les batteries conformément aux instructions du fabricant.

**Specifications**

| | |
|---|---|
| Nominal voltage | 3 V |
| Nominal capacity | 220 mAh |
| Continous standard load | 0.2 A |
| Operating temperature | -30 to +60 °C |
| Max. abnormal charging current | 5.0 mA |

*[Tab. 1] Battery type CR2032 - specifications and dimensions.*




**Battery replacement**

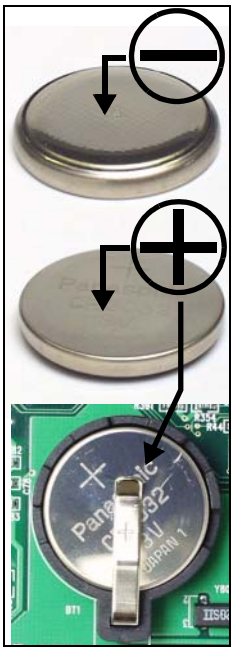
1. Switch off the printer. Disconnect the power cord.
2. Take off the rear hood.

➠ Prior to installation of the new battery: wipe the battery and the equipement terminal clean using a dry cloth.
➠ Ensure, that dust and other foreign substances will not cause shorting between the poles.
➠ When handling batteries, wear finger covers or gloves made of rubber, cotton, etc. to protect the battery from dirt.

3. Take used battery out of the socket; insert the new battery.

➠ Take care of the correct polarity (see fig. right)!

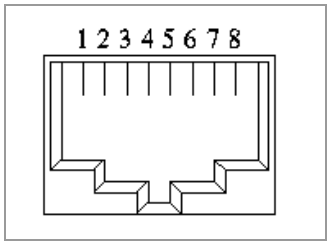
4. Reassemble the rear hood.
5. Reconnect the printer to the mains and switch it on.
6. Set time and date (SYSTEM PARAMETER > Realtime clock).



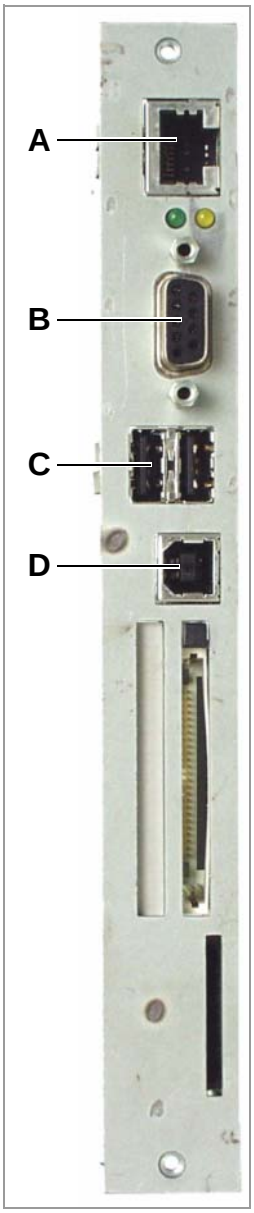
## Data interfaces at the mounting plate

(A) Ethernet

| Pin | Signal |
|---|---|
| 1 | TD + |
| 2 | TD – |
| 3 | RD + |
| 4 | Termination |
| 5 | Termination |
| 6 | RD – |
| 7 | Termination |
| 8 | Termination |



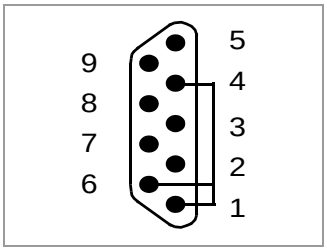

*[Tab. 2] Pin assignment of the Ethernet interface (RJ 45).*




(B) RS 232

➠ Pin assignment looked at from „PC point of view“! (Device = DCE)

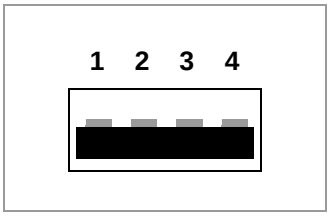
| Pin | Signal |
|---|---|
| 1,4,6 | connected |
| 2 | RxD |
| 3 | TxD |
| 5 | GND |
| 7 | RTS |
| 8 | CTS |
| 9 | not used |




*[Tab. 3] Pin assignment of the RS 232 interface (D-Sub 9, female).*

(C) USB-A

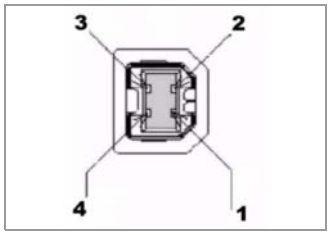
| Pin | Signal |
|---|---|
| 1 | +5 V |
| 2 | Data – |
| 3 | Data + |
| 4 | GND |




*[Tab. 4] Pin assignment of the USB-A interface (host, type A).*

(D) USB-B

| Pin | Signal |
|---|---|
| 1 | +5 V |
| 2 | Data – |
| 3 | Data + |
| 4 | GND |

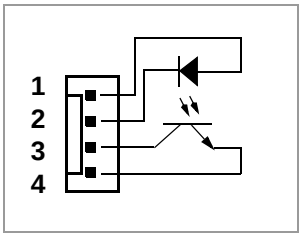



*[Tab. 5] Pin assignment of the USB-B interface (device, type B).*

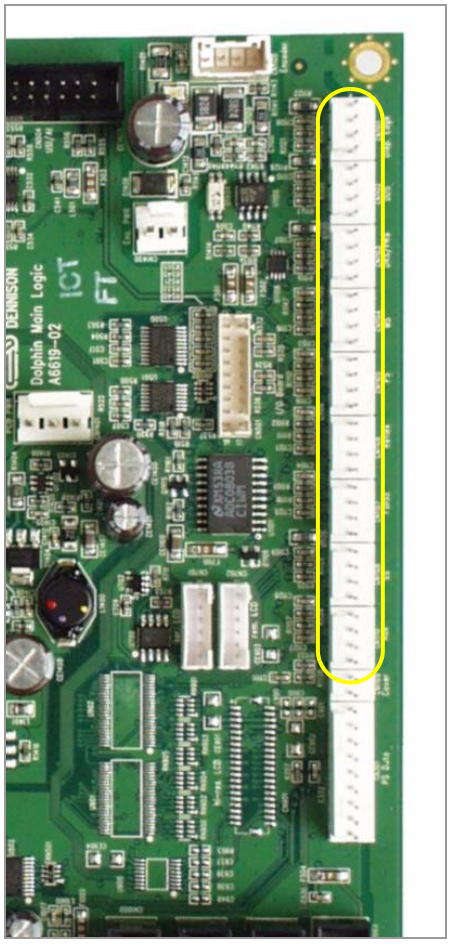
## Sensor connections

The pin assignment and connection diagram described below applies to the sensor connections H to P in fig. [1] (yellow marking in [3]).

| Pin | Signal |
|---|---|
| 1 | Anode |
| 2 | Cathode |
| 3 | Collector |
| 4 | Emitter |




*[Tab. 6] Pin assignment and connection diagram of the sensor connectors.*




*[3] Right: yellow marking = sensor connections on the CPU board.*

# Centronics daughter board

## Application notes

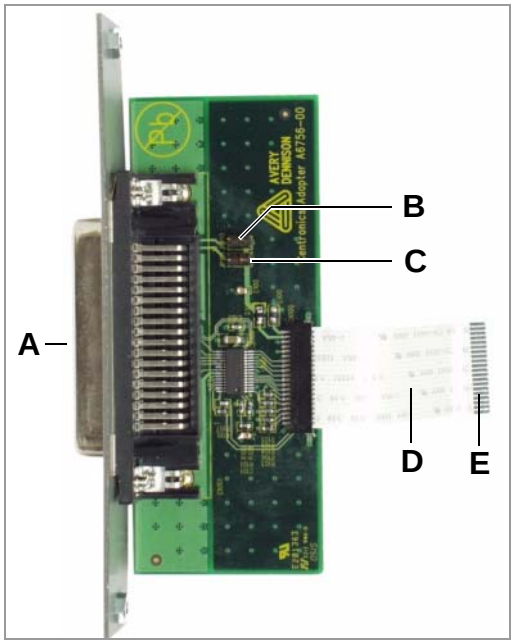
This board offers the possibility to optionally equip the device with a parallel Centronics interface.

Requirements:

- ➠ For reasons of limited mounting places, this board can not be mounted into a device, which is already equipped with the optional I/O-board.
- ➠ This board can not be mounted into a PM 3000.

- CPU-board A6621
- Device firmware version 4.12 or higher

## View

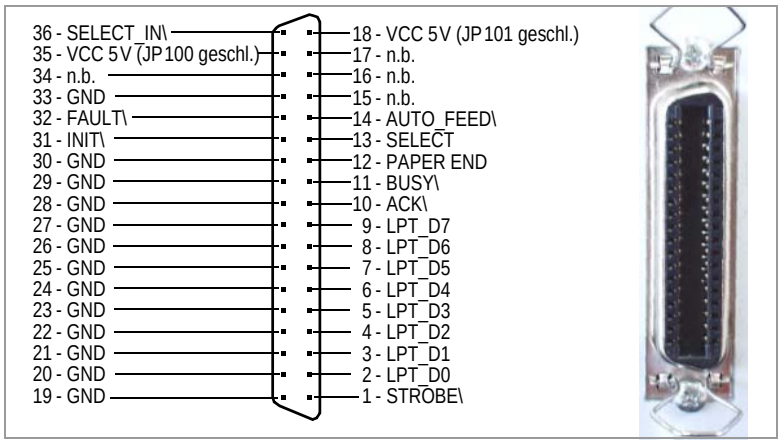



*[4] Centronics daughter board (A6758).*

**A** Centronics jack IEEE 1284 B 36pin
**B** JP 100: Jumper connected = 5 V at pin 35
**C** JP 101: Jumper connected = 5 V at pin 18
**D** FFC (Flat Flex Cable) connection to CPU-board A6621 (connect there to CN 1301 [5])

*[5] Mounting position of the board. The silver coloured contacts (E) at the FFC-cable must show to the right when connecting it (see arrow).*

### Pin assignment




*[6] Pin assignment of the Centronics jack IEEE 1284 B.*

## CF daughter board

### Application notes

CF = CompactFlash

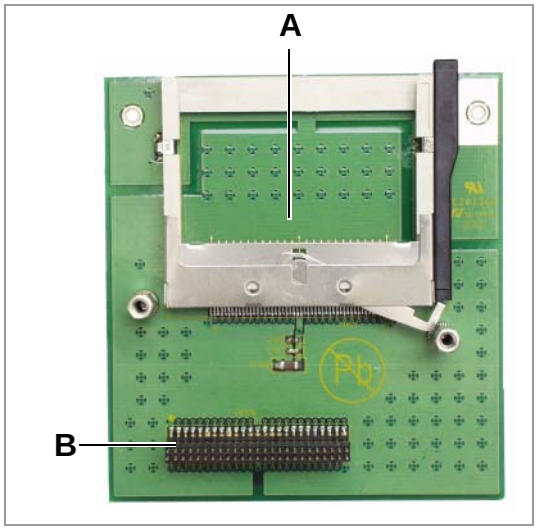
This board is for optional equipement of the device with a second slot for CF-cards (the first slot is standard on the CPU-board).

➠ This board can not be mounted into a PM 3000.

Requirements:

- CPU-board A6621
- Device firmware version 5.00 or above
- List of suitable CF-cards: see Plug-in card manual 🗋, topic section „Card types“, „CompactFlash-card“.

### View



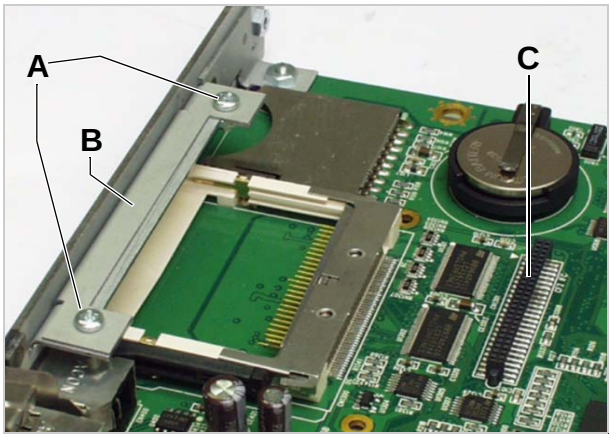

*[7] CF daughter board (A6624).*

**A** CF-card slot
**B** Plug-in contacts for CPU-board connection (connect there to CN 1301)

## Connecting

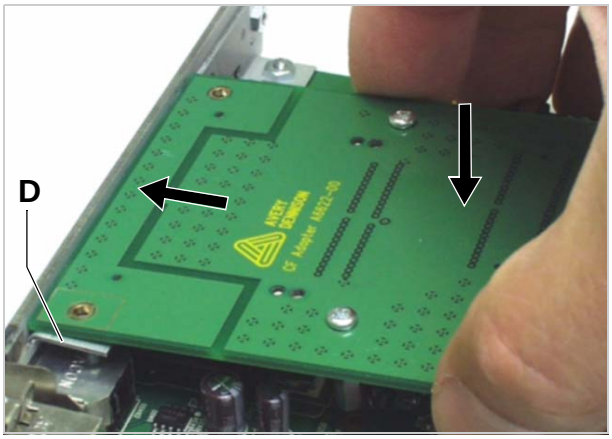
Tool: Cross-head screwdriver

1. Remove screws [8A]. Remove cover plate [8B].



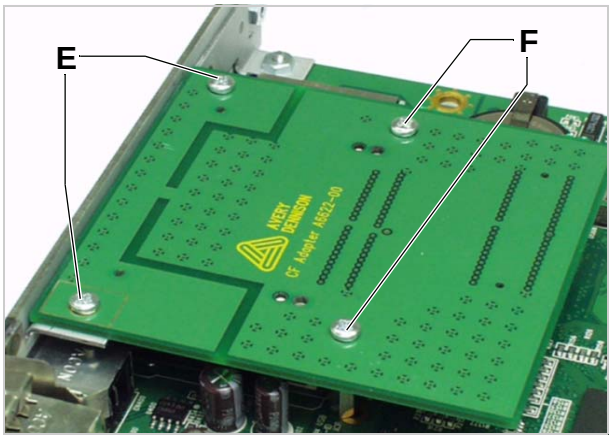

[8] CPU board with mounted cover plate (B).

2. Lay the left board edge onto the remaining metal angle [9D]. Press the right side of the board with its contacts [7B] into the connector [8C] on the CPU-board.




[9] Plugging in the adapter board.

3. Fix the board to the metal angle using the two screws [10E]. Additionally fix the board with two screws from the CPU-board rear side into the hex bolts at position [10F].




[10] Fixing the adapter board.

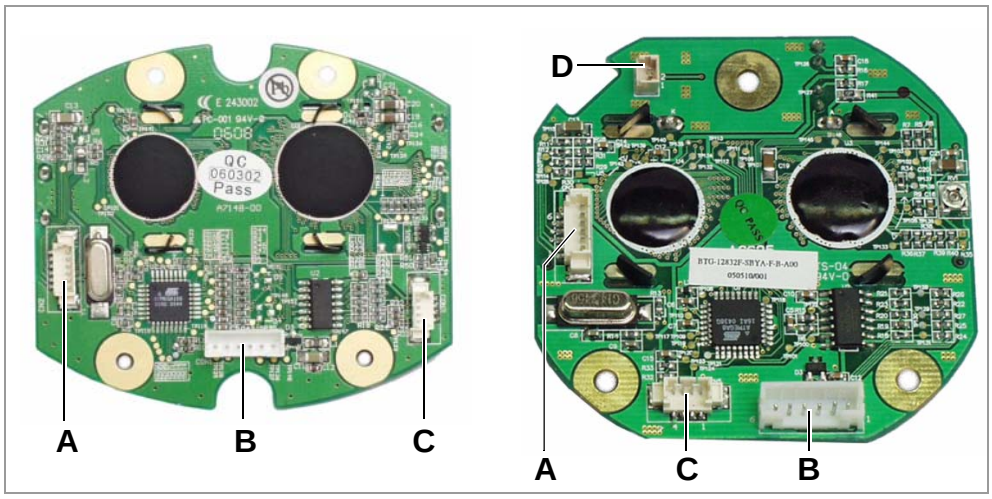
# Operation panel boards

## Application notes

Requirements:

- CPU-board A6621
- Device firmware version 4.12 or above

## View




*[11] Operation panel boards for 64-xx (left: A7149) and for DPM/PEM/ALX (right: A6626).*

**A** Connection programming adapter (only for factory-internal use)

**B** Connection CPU-board (connect there to CN 701)

Caution - compared to electronics „…6/06“, the article numbers for the cables were changed. The valid numbers are:

– 64-xx: A7058
– DPM, PEM, PM 3000: A8176
– ALX 92x: A8177

**C** Connection $I^2C$-bus (reserved)

**D** Connection for fifth button (reserved, only at board A6626)

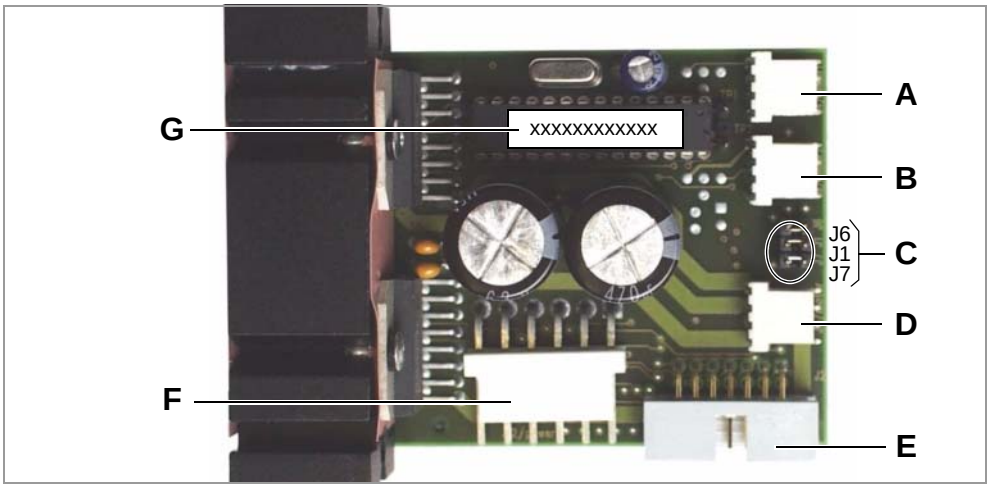
# Output stage board

## Application notes

In case of replacing an output stage board, keep in mind the following points (see tab. [12]):

– Article number (see label on the board)
– PIC version (see label on the microcontroller [12G])
– Jumper setting (matching the motor)

## View




*[12] Output stage board (A2742).*

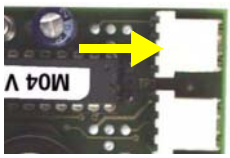
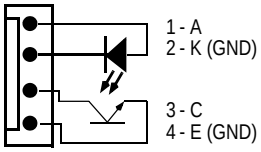
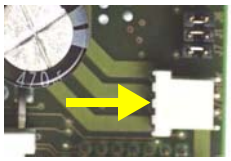
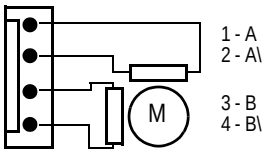
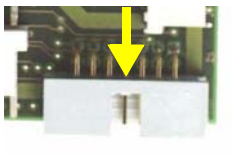
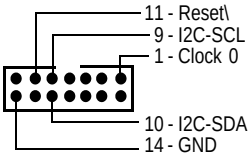
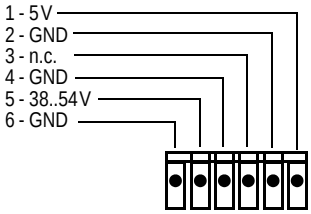
**A** J4: Sensor
**B** J8: Optional sensor
**C** Jumper setting of the motor type to which the board applies
**D** J3: Motor
**E** J2: Connection CPU-board (Data cable)
**F** J12: Connection power supply
**G** PIC version

| Output stage applies to… | PIC version | Part no. | Motor cable | Sensor cable | Jumper set | | |
|---|---|---|---|---|---|---|---|
| | | | | | J6 | J1 | J7 |
| Feed motor (ALX) | M04A V3 F73 | A6713 | FM | – | X | X | X |
| Feed motor | M04A V3 F73 | A2742 | FM | – | X | X | X |
| Ribbon motor | M04A V3 F73 | A2742 | RM | RS | X | X | |
| Printhead motor | M04A V3 F73 | A2742 | HM | HS | X | | X |
| Rewinder/Feed motor (64-xx Disp.) | M04A V3 F73 | A2742 | DRM | – | | X | X |
| Options motor [a] (64-xx) | M04A V3 F73 | A2742 | OM | OS | X | | |
| Options motor (PM 3000) | M04A V3 F73 | A2742 | MOTOR | SENSOR | X | | |
| Deflection motor (64-xx Dispenser) | M04A V3 F73 | A2742 | DLM | DLS | X | | |
| Rewinder motor (ALX) | R04A V4 F876A | A3036 | WM | WS | | X | X |

[Tab. 1] Overwiew: output stage configurations for the different motors.

*a) for „Cutter 2000“ or „Rewinder 2000“.*

## Connections

| Picture | Comp. diagr. | Type on board | Type at cable | Pin assignment on board |
|---|---|---|---|---|
|  | J4 | PANCON MLAS 100-04 | AMP 643813-4 or AUK MK-04H |   |
|  | J3 | PANCON MLAS 100-04 | AMP 643813-4 or AUK MK-04H |   |
|  | J2 | Wieson 2120-14RS5 | MOLEX 70450 Version b |   |
| | J12 | AMP 640389-6 | AMP 0-644465-6 MTA 156 18 AWG |   |

*[Tab. 2] Connections on the output stage board.*

# USI Board

## Application notes

**Utilization**

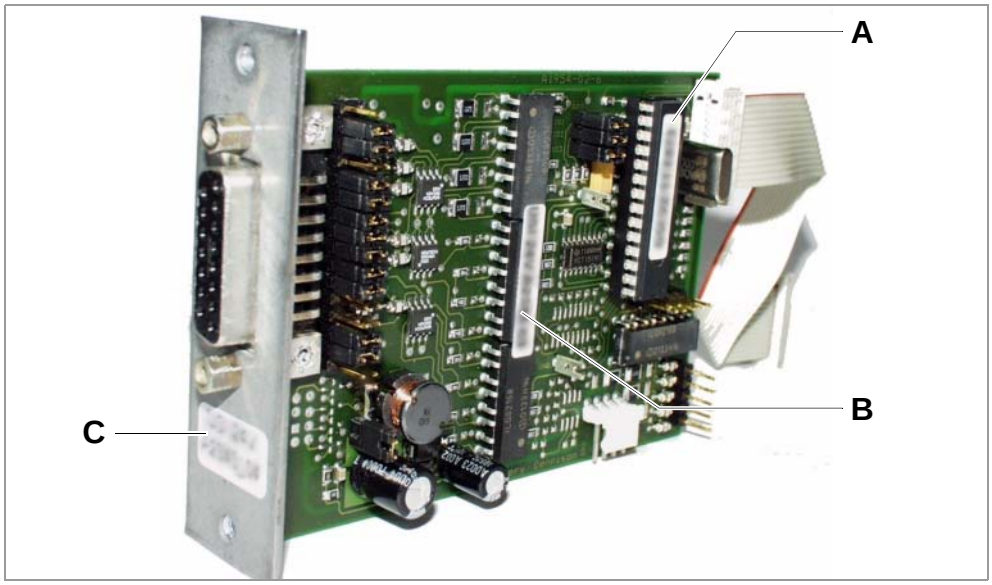
The USI (Universal Signal Interface) is an optional interface for all machine types listed in the headline of this page.

USI-equipped machines can for example control applicators or scanners. The input signals can be used to trigger the print-dispense-process. The output lines signal the operating status - e.g. material or ribbon end - so that the machine can be integrated completely into a system.

The USI comes on a separate board and can be easily retrofitted.

**Compatibility**

➠ DPM, ALX 92x: USI and AI (Applicator Interface) can not be built into the same device.




*[13] Version designations on the USI board.*

**Version**

➠ The functionality described in this section is only then fully available, if USI board, Controller and printer firmware match the following requirements:

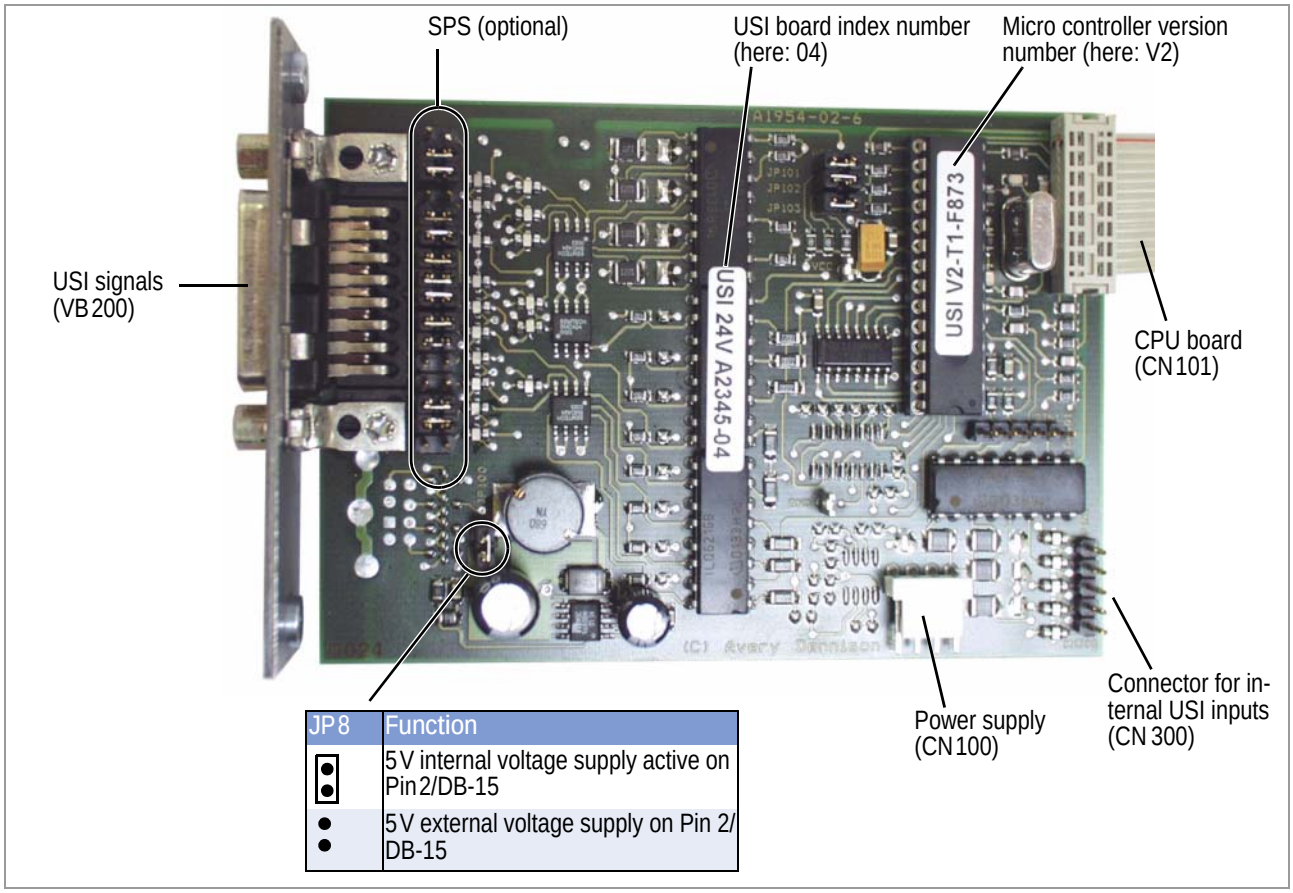
- *USI board*: At least A2062-08 (5 V USI) or A2345-09 (24 V USI) or with a higher index number. Displaying the index number: Sticker on the board [13B, C].

- *USI controller*: At least V6-T36 or a later version with a higher V-number. Displaying the version:
  – Sticker on the microcontroller [13A]
  – Parameter menu: SERVICE DATA > > MODULE FW VERS. > USI interface
  ➠ Controller version *older* than V6-T36: Update is only possible by exchanging the controller (see chapter Replacing the controller 🗋 on page 25).
  ➠ Controller version V6-T36 or higher: Update can be done by loading new firmware (same procedure as for printer firmware update, see topic section Firmware 🗋). Requirement: printer firmware of at least version 5.30 is installed.

- *Printer firmware*: 5.0 or higher. Displaying the firmware version:
  – Parameter menu: SERVICE DATA > > MODULE FW VERS. > System version
  – During powering up the printer

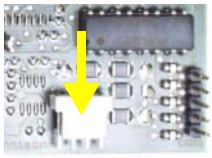
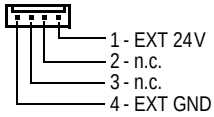
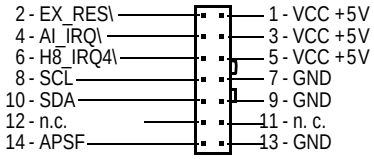
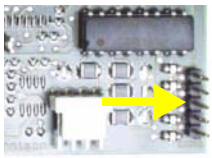
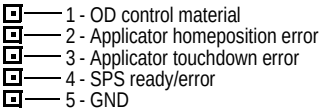
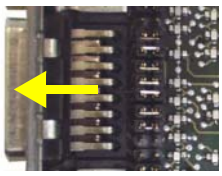
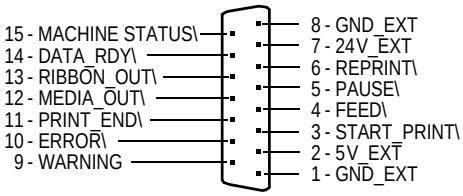
| | |
|---|---|
| Connection type | NPN |
| Signal voltage | optionally 5 or 24 V |

View


SPS (optional)
USI board index number (here: 04)
Micro controller version number (here: V2)
USI signals (VB 200)
USI 24V A2345-04
USI V2-T1-F873
CPU board (CN 101)
Connector for internal USI inputs (CN 300)
Power supply (CN 100)
JP8
Function
5 V internal voltage supply active on Pin 2/DB-15
5 V external voltage supply on Pin 2/DB-15

*[14] USI-board (A2345).*

## Connectors

| Picture | Comp. Diagr. | Type on board | Pin assignment on board |
|---|---|---|---|
|  | CN100 | AMP 640457-4 |   |
| | CN101 | Cable is soldered to the board |   |
|  | CN300 | |   |
|  | VB200 | |   |

*[Tab. 3] Connectors on the USI board.*

## Signals at the D-Sub 15 connector

| Pin | Signal | Function |
|---|---|---|
| 1 | GND_EXT | Ground contact |
| 2 | 5V_EXT (Voltage supply) | *JP8 connected*: Internal 5 V source can be used via the wire for external sensors.<br>*JP8 clear*: Wire can be used for an external 5 V source. |
| 3 | START_PRINT\ (Input) | The machine starts printing depending on the setting of parameter DP INTERFACE > Start print mode.<br>Preconditions: Printjob is available (DATA RDY\ low), printer is in online mode, no error messages. |
| 4 | FEED\ (Input) | Feeding of the label material as long as the signal is low. Minimum feed quantity: 1 label. The display shows „USI feed“ during feeding.<br>Preconditions for feeding:<br>• Offline mode, printing has been stopped or the printer is in USI-paused mode.<br>• Online mode and no print job loaded. |

*[Tab. 4] Signal designations and functions of the USI interface.*

| Pin | Signal | Function |
|---|---|---|
| 5 | PAUSE\ (Input) | A high-low-transition switches the printer into the USI-paused mode. A further high-low-transition switches the printer back into the online mode.<br><br>If parameter DP INTERFACE > Start print mode is set to *Level high active* or *Level low active*, any activating of the PAUSE\ signal stops the printing after the current label.<br><br>Features:<br>• „USI Pause“ is displayed<br>• ERROR\ is activ (low)<br>• If a print job is available: DATA RDY\ is inactive (high)<br>• Start print signals are suppressed<br>• Reprint requests are proceeded after switching into online mode.<br>• Precondition: START PRINT\ inactive (high). |
| 6 | REPRINT\ (Input) | The last printed label is being reprinted as long as REPRINT\ is low. Minimum reprint quantity: 1 label.<br><br>Preconditions:<br>• The label which is ought to be reprinted, must be ready printed and dispensed.<br>• Printer is in online mode.<br>• If a REPRINT\ is triggered while the printer is in USI-pause mode, the reprint will be proceeded as soon as the printer is switched back in online mode.<br>• Precondition: START PRINT\ inactive (high). |
| 7 | 24V_EXT (Voltage supply) | Voltage supply for external sensors |
| 8 | GND_EXT (GND) | Ground contact |
| 9 | WARNING (Output) | *Ribbon low warning:*<br>The signal is activated (high), if<br>a) DP INTERFACE > Ribbon signal = *activated* and<br>b) The ribbon stock is below the threshold value, which is set in parameter SYSTEM PARAMETER > Ribbon warning. After changing the ribbon roll, the signal will be inactivated after a short time.<br><br>*Material end warning:*<br>The signal is activated (high), if<br>a) DP INTERFACE > Material signal = *activated* and<br>b) The label material stock is below the threshold, which is set by positioning the light barrier. After changing the material roll, the signal will be inactivated.<br><br>The WARNING output is only then inactivated (low), if ribbon and material both are available in a sufficient amount. If one of both rolls falls below the threshold value, the output switches activ (high).<br>In practice, the more or less eccentric running material roll will trigger the material warning repeatedly, until the roll diameter falls below a certain tolerance zone.<br><br>This signal is only a warning, what means that the printing goes on. |

*[Tab. 4] (Cont.)Signal designations and functions of the USI interface.*

| Pin | Signal | Function |
|---|---|---|
| 10 | ERROR\ (Output) | This output is activated (low) during every status which keeps the printer from printing:<br>USI-pause mode, stopped mode, offline mode, cover open, material end, no punch recognized, pressure roller open, ribbon end and other failures which avoid printing.<br>During the initialization of the printer, the output is inactive (high)! |
| 11 | PRINT_END\ | The manner in which this output is switched depends on the setting of parameter DP INTERFACE > End print mode.<br>Difference to older versions of printer firmware (below 2.46): The output is now also activated as long as labels are fed.<br>➠ Limitation: This functionality is not available in Batch mode!<br>➠ 64-xx with LTSI applicator mounted (with PLC version 5.0 and higher): PRINT_END\ is not available. |
| 11 | HOME_POS\ (Output) | ➠ Only valid for 64-xx with LTSI applicator mounted (with PLC version 5.0 and higher):<br>• HOME_POS\ replaces PRINT_END\.<br>• HOME_POS\ is active, if the LTSI is in home position (upper limit position) |
| 12 | MEDIA_OUT\ (Output) | Low in case of material end. Additionally activated are:<br>• ERROR\<br>• MACHINE STATUS\ |
| 13 | RIBBON_OUT\ (Output) | Low in case of ribbon end. Additionally activated are:<br>• ERROR\<br>• MACHINE STATUS\ |
| 14 | DATA_RDY\ (Output) | This signal is *activated* (low), if the printer has finished image processing and is ready to start printing.<br>The signal is *inactivated*, if<br>• the print job is done, or<br>• the printer is switched to stopped mode, offline mode or USI-pause mode. |
| 15 | MACHINE STATUS\ (Output) | This output is activated (low), if the printing has been interrupted by a disturbance or an error. Examples are: Pressure roll open, hood open, ribbon- or material end error, start print error or another fault that avoids printing.<br>The output is also activated during the initialization of the printer.<br>➠ In comparison to ERROR\, MACHINE STATUS\ is *not* low if the printer has been switched to offline or pause mode.<br>➠ 64-xx with LTSI applicator mounted (with PLC version 5.0 and higher): MACHINE_STATUS\ is not available. |

*[Tab. 4] (Cont.)Signal designations and functions of the USI interface.*

## Application of the internal inputs at CN 300

The following parameter settings are required to make the internal inputs useable:

PLC

For usage with PLC:

- DP INTERFACE > Interface type = *USI Applicator*
- DP INTERFACE > Internal inputs = *Enabled*

OD sensor

For useage with „OD sensor material“:

- DP INTERFACE > Material signal = *Enabled*
- DP INTERFACE > Internal inputs = *Enabled*

If PLC and „OD sensor material“ are ought to be used, all three parameter settings have to be done.

➠ To all four inputs applies: The input is inactivated if it is connected to ground potential!

## Signal description of the internal inputs at CN 300

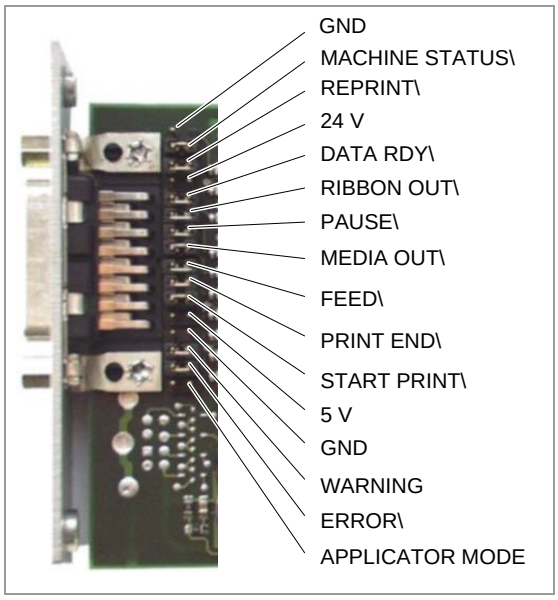
| Pin | Signal | Signal type | Function |
|---|---|---|---|
| 1 | OD control material | In | To be applied to the OD control material option.<br>The signal WARNING at pin 9 of the DB 15 is switched activ, if<br>• Parameter DP INTERFACE > Material Signal = *Activated a*nd<br>• the input is high |
| 2 | Applicator fault home position | In | If one of the inputs is high or makes a low-high-transition, the appropriate status message is displayed at the printer. Additionally, the outputs ERROR\ and MACHINE STATUS\ will be activated (low). |
| 3 | Applicator fault touch down | In | |
| 4 | PLC ready / fault | In | |
| 5 | GND | Ground | GND potential of the internal inputs |

*[Tab. 5] Signal designations and functions of the internal inputs*

## Pin assignment jumper block

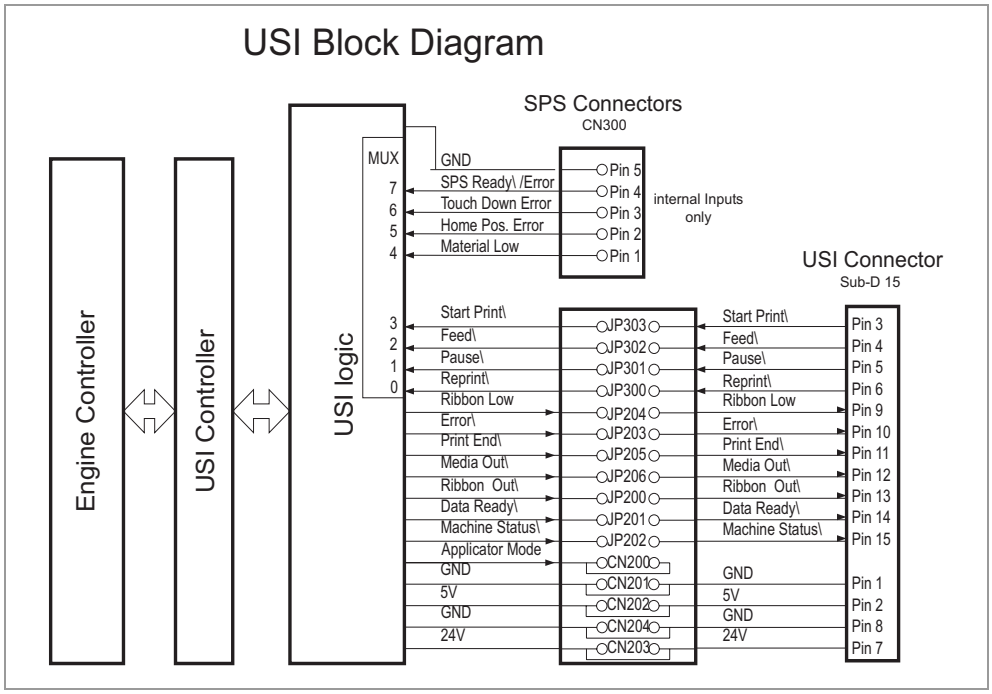
Each signal of the D-Sub connector can be interrupted separately at the jumper block.

➠ The voltage and ground wires are through-connected and cannot be interrupted [15]!



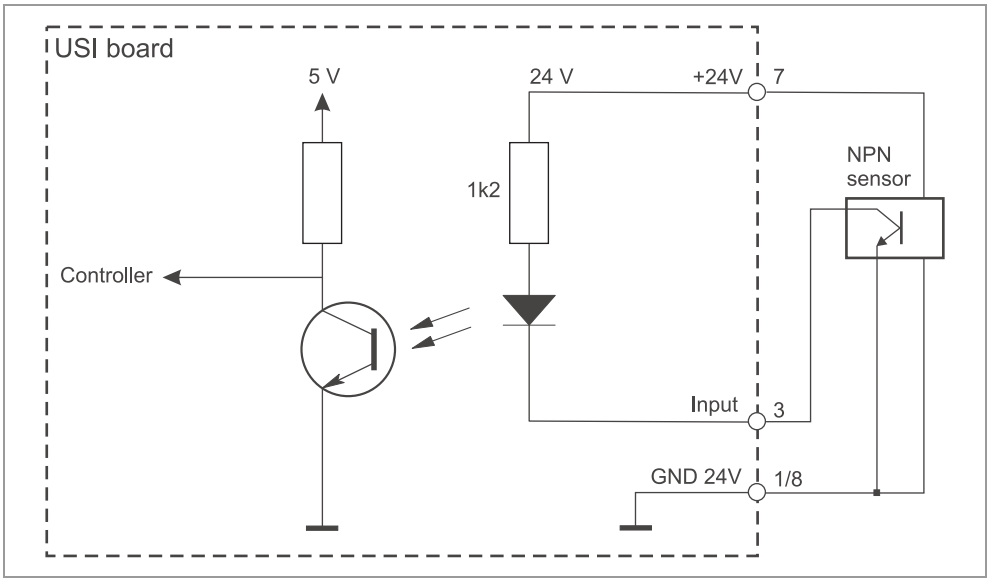

*[15] Pin assignment jumper block*

## Block diagram




*[16] Block diagram of the USI*

## Circuit diagrams for signal inputs

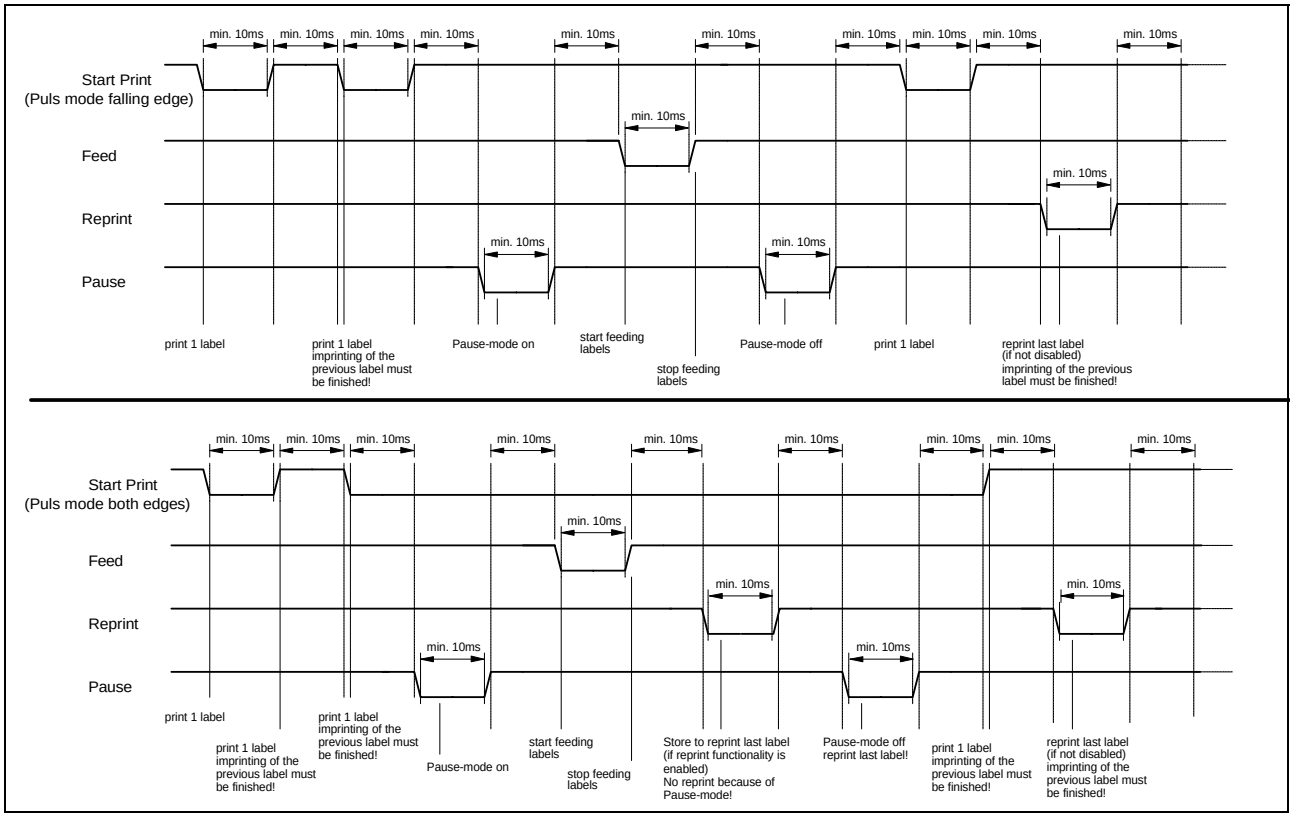



*[17] Main circuit for signal inputs (NPN) at the USI interface (here: connecting a start sensor).*

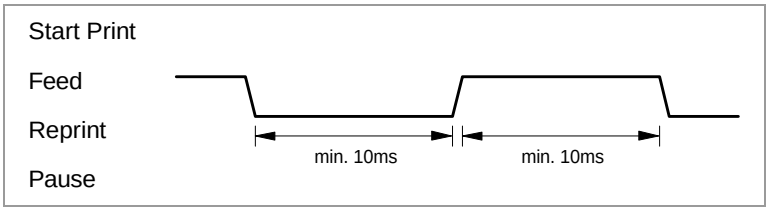
**Timing waveform of input signals**

The following criteria must be matched by the input signals of the USI:

- Only one signal at a time may be switched active!
- The input signals must switch bounce-free!

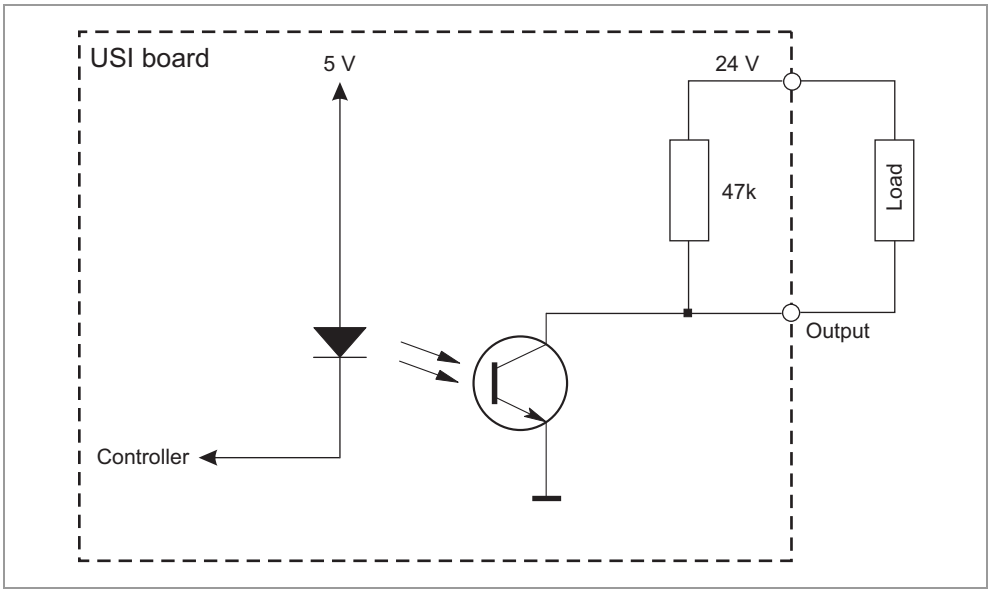

Start Print
(Puls mode falling edge)
Feed
Reprint
Pause
min. 10ms
print 1 label
print 1 label imprinting of the previous label must be finished!
Pause-mode on
start feeding labels
stop feeding labels
Pause-mode off
print 1 label
reprint last label (if not disabled) imprinting of the previous label must be finished!
Start Print
(Puls mode both edges)
Feed
Reprint
Pause
min. 10ms
print 1 label
print 1 label imprinting of the previous label must be finished!
print 1 label imprinting of the previous label must be finished!
Pause-mode on
start feeding labels
stop feeding labels
Store to reprint last label (if reprint functionality is enabled)
No reprint because of Pause-mode!
Pause-mode off
reprint last label!
print 1 label imprinting of the previous label must be finished!
reprint last label (if not disabled) imprinting of the previous label must be finished!

*[18] Examples of timing waveform for the USI inputs.*




*[19] Signal timing - to be met.*

## Circuit diagrams for signal outputs

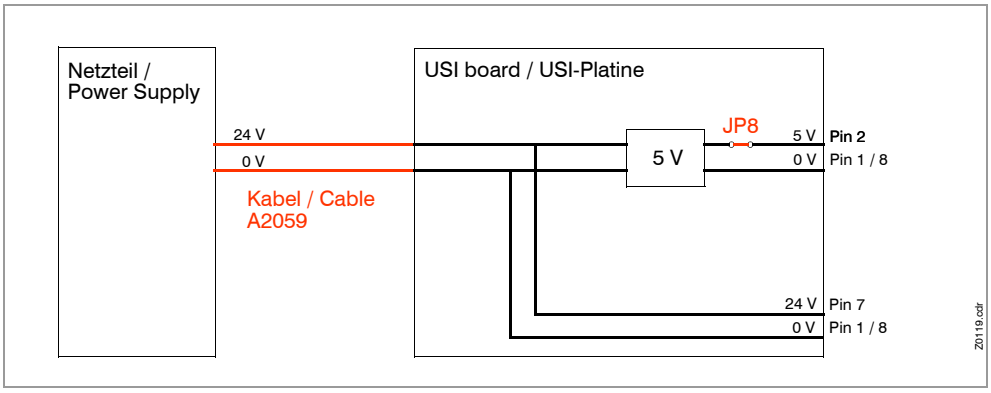



*[20] Main circuit (NPN) for signal outputs at the USI interface.*

Max output current

In the state of delivery (jumper 8 closed, cable A2059 connected), the supply voltages (5 V on pin 2 and 24 V on pin 8) are provided by the USI. The output current is limited:

➠ Maximum current per output line: 50 mA; all output currents together may not exceed 700 mA.




*[21] USI in the state of delivery: The voltage cable is connected, JP 8 is closed.*

External supply

CAUTION

In previous versions of this document, the external voltage supply of the USI was described.

External voltage supply without external current limiting elements is no longer permitted (risk of fire) [a].

In case of applications that externally supply voltages, a current limiting element *must* be provided by the system integrator.

Examples of suitable current limiting elements in the supply circuit are:

- Poly fuse with UL 1434 approval
  24 VDC: $I_{hold}$ = 0.65 mA; $U_{min}$ = 30 V
  5 VDC: $I_{hold}$ = 0.65 mA; $U_{min}$ = 6 V
- Micro fuse according to IEC EN 60127
  24 VDC: T 630 mA L 250 V
  5 VDC: T 630 mA L 250 V

*a) Due to an update of EN 60950-1.*

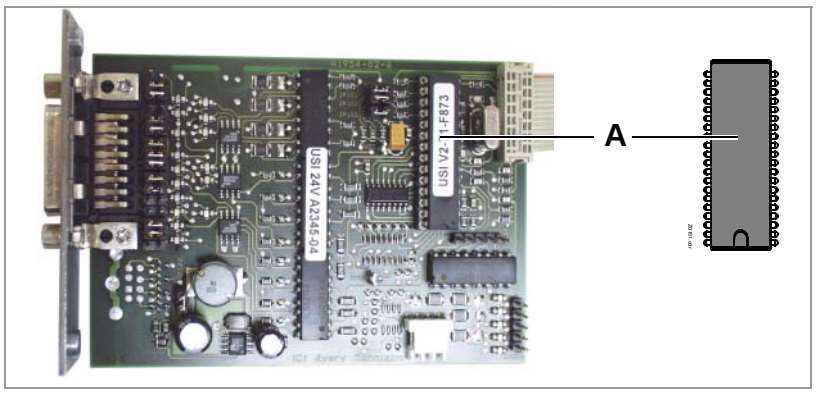
## Replacing the controller

A firmware update for controller versions older than V6-T36 can only be done by replacing the controller [22A].

Article number of the controller with the most recent firmware: A3379.

Version check

Displaying the current controller version: SERVICE DATA > >MODULE FW VERS. > USI interface.




*[22] The controller (A) contains the USI firmware.*

Controller replacement

1. Switch the printer off, pull out the mains connector.
2. Open the rear hood.
   See topic section Service Mechanics, section „Housing“, chapter „Rear hood“.
3. Take the controller [22A] out of the socket.
4. Insert the new controller into the socket.

➠ The dent in the controller housing must show in the pictured direction!

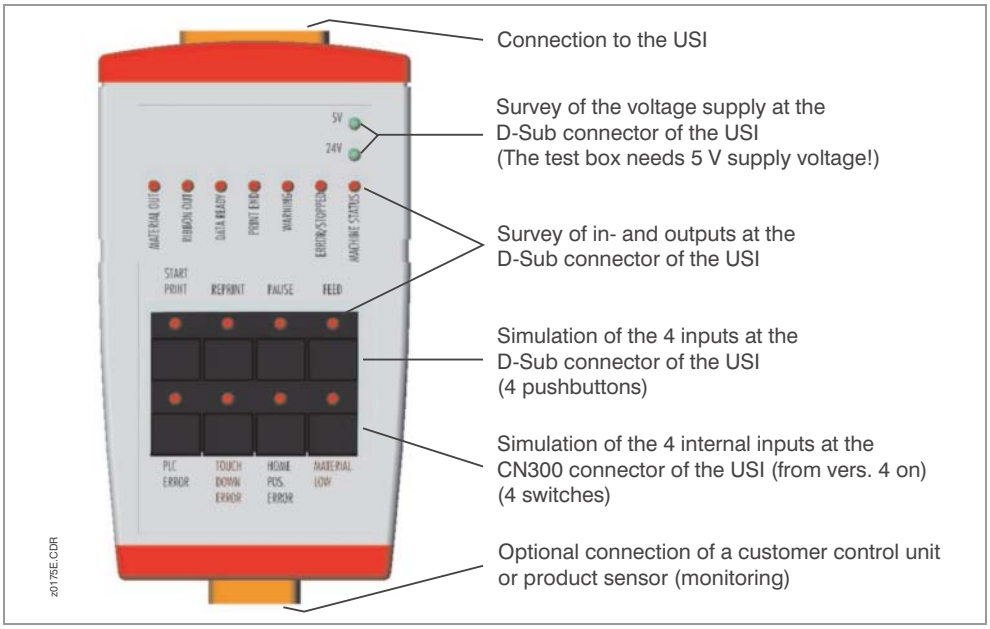
# USI testbox

## Application notes

- Simulating USI inputs
- Checking USI outputs
- Monitoring of drive signals sent by the system control
- Aid for setting up the machine.

*[23] Left side: USI testbox (A2739); right side: connecting cable (A2842). Both parts are required for application (Both parts: A2843).*

## View


Connection to the USI
Survey of the voltage supply at the D-Sub connector of the USI (The test box needs 5 V supply voltage!)
Survey of in- and outputs at the D-Sub connector of the USI
Simulation of the 4 inputs at the D-Sub connector of the USI (4 pushbuttons)
Simulation of the 4 internal inputs at the CN300 connector of the USI (from vers. 4 on) (4 switches)
Optional connection of a customer control unit or product sensor (monitoring)
5V
24V
START PRINT
REPRINT
PAUSE
FEED
PLC ERROR
TOUCH DOWN ERROR
HOME POS. ERROR
MATERIAL LOW
z0175E.CDR

*[24] Operating parts and connections of the USI testbox.*

## Connecting the test box

➜ Connect the connecting cable D-Sub25 connector to the appropriate socket at the testbox.

➜ Connect the connecting cable D-Sub15 connector to the appropriate socket at the USI.

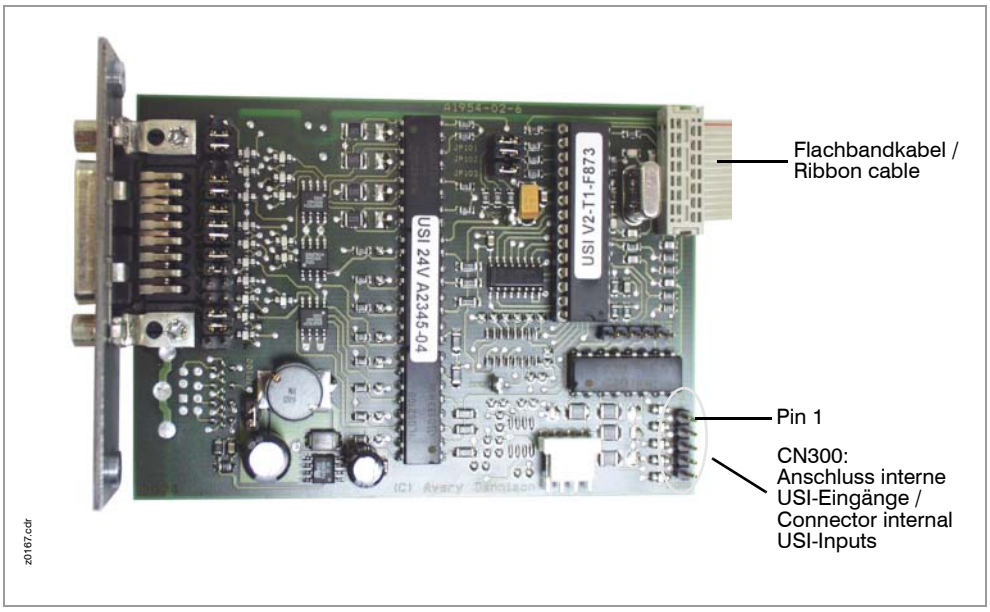
**Connection to internal inputs**

Given version 4 of the USI, the 5-pin connector of the connection cable can be connected to the *internal inputs* of the USI:

➜ Plug the connector strip onto CN300.

➠ Connect the black cord of the connector strip to pin 1! (see [25] and [26])

*[25] The connector strip for connecting the testbox to the internal inputs of the USI. The mounting orientation is printed on the cable: „black on CN300 pin 1“.*




*[26] Pin 1 is the first pin in direction of the ribbon cable; the writing CN300 Pin 1 can be found beside the pins on the USI board.*

The D-Sub15 socket at the testbox has the same pin assignment as the D-Sub socket of the USI. Plug the system control into this socket and connect the testbox to the USI as described above, in order to monitor the 4 USI inputs.

## Operation

LEDs

- After powering on the printer, the LEDs on the testbox show the current levels of the USI outputs, with the following meaning:
  – LED *off*: USI output = *High*
  – LED *on*: USI output = *Low*
- The supply voltage LEDs indicate:
  – LED *off*: Voltage not applied
  – LED *on*: Voltage applied
- Each pressing of a key or switch pulls the respective input level down to *Low*, with the LED on the key or switch lighting up.
- The LEDs on the keys also light up, if the level of the corresponging input at the D-Sub15 socket is pulled to *Low* (monitoring). This can e.g. be done by a connected system control or light barrier.

  Even with a system control connected can the USI inputs be activated by pressing the appropriate key (set-up operation).
- With the testbox being connected to the USI merely by the D-Sub15 connector, the following functions are available:
  – Displaying the USI output levels
  – Simulation and monitoring of the 4 USI inputs START_PRINT\, REPRINT\, PAUSE\ und FEED\
  – Survey of the voltage supply with 5 V and 24 V

Internal inputs

- Additionally, the internal USI-inputs can be simulated, if the 5-pin connector strip is plugged into CN300 on the USI board [26].

| Internal USI-input | Switch |
|---|---|
| PLC ready / fault | PLC ERROR |
| Applicator fault touch down | TOUCH DOWN ERROR |
| Applicator fault home position | HOME POS. ERROR |
| OD control material | MATERIAL LOW |

*[Tab. 6] The switch designations (right column), which are printed on the testbox, differ slightly from the signal designations (left column).*

➠ Befor starting the simulation, the following parameter settings are required:

| Menu | Parameter | Setting |
|---|---|---|
| DP INTERFACE | Interface type | USI applicator |
| | Material signal | Enabled |
| | Internal inputs | Enabled |

*[Tab. 7] Parameter settings which should be done before starting the simulation.*

➠ The internal inputs are high-active, what means that the switches PLC ERROR, TOUCH DOWN ERROR or HOME POS. ERROR respectively have to be pressed before starting the simulation!

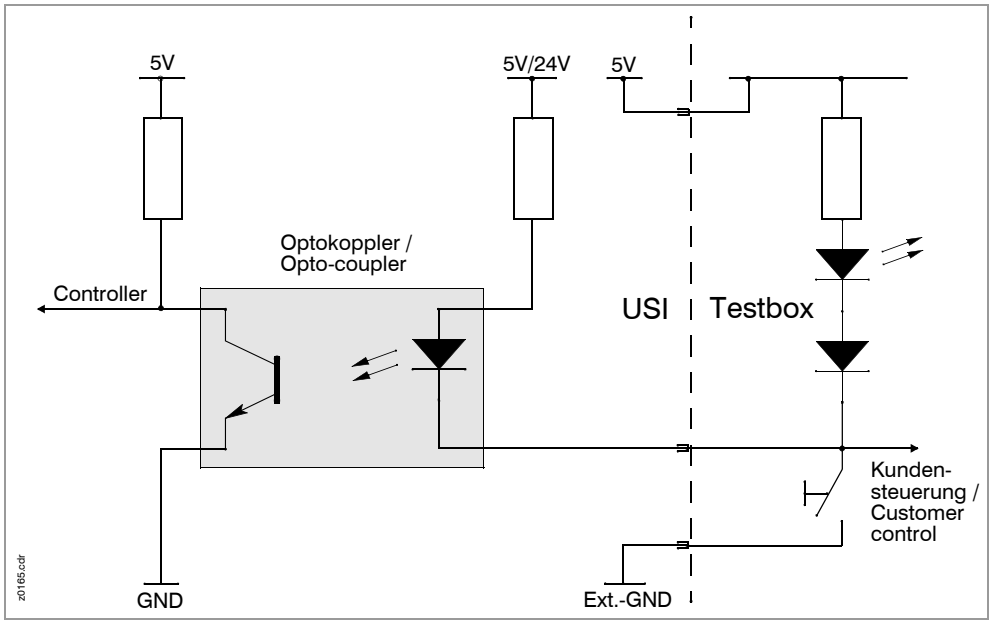
Releasing one of those switches (LED off) stops the machine; additionally, the appropriate status message is displayed. The machine can only be further operated, if the testbox switch is pressed again (error withdrawn, LED on) and the status message is acknowledged at the printer operating panel.

Internal input „OD control material“ (switch MATERIAL LOW):

Releasing this switch (LED off) switches the WARNING-output of the USI *high*. Thus, the WARNING-LED on the testbox goes out. The machine is not being stopped.

➠ The WARNING-output also shows the close end of ribbon stock; what means that this ouput can change its level without the MATERIAL LOW switch being pressed.

## Diagram of a USI input




*[27] Simplyfied diagram of a USI input.*

# I/O Board

## Application notes

➠ The I/O board can not be mounted into a PM 3000.

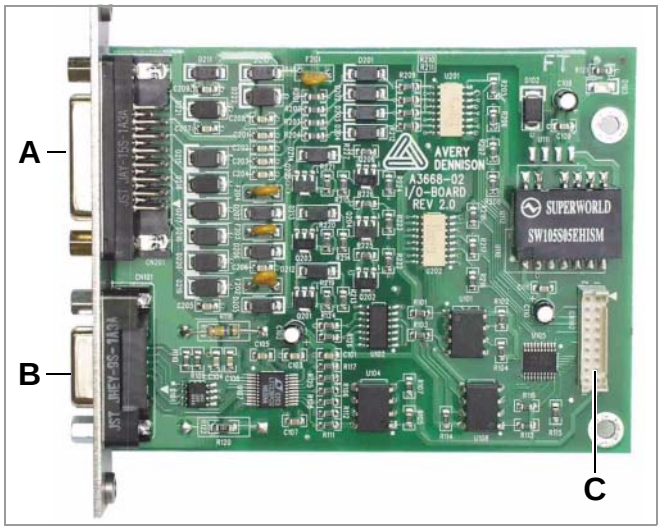
**Requirements** Device firmware version 5.00 or above.

**Applications** The I/O board may be used for 2 different applications:

- 2nd RS 232 interface:
  The I/O board provides a RS 232 interface, which can be applied additionally to the one on the CPU board. The 2nd interface can e.g. be used to connect a bar code scanner.
- RS 422/485 interface:
  If there is a long distance between host and printer, RS 485 or RS 422 is sometimes used instead of RS 232 or Centronics. This is often realized in industrial plants, where galvanic isolation is required to avoid ground loops.

➠ The two serial interface types cannot be used at the same time.

## View




*[28] I/O-board (A8258).*

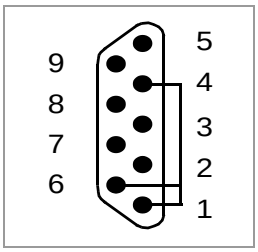
**A** CN 201: Not yet supported
**B** CN 101: RS 232/422/485
**C** CN 101: Connection CPU-board (connect there to CN 501)

## Connectors

(B) RS 232

➠ Pin assignment looked at from „PC point of view“ (Device = DCE)!

| Pin | Signal name (host) | Signal direction at the I/O board |
|---|---|---|
| 1 | DCD | Short with DTR & DSR |
| 2 | RxD | Out |
| 3 | TxD | In |
| 4 | DTR | Short with DCD & DSR |
| 5 | GND | |
| 6 | DSR | Short with DCD & DTR |
| 7 | RTS | In |
| 8 | CTS | Out |
| 9 | RI | Not connected |



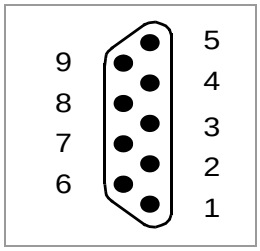

*[Tab. 8] Pin assignment of the RS 232 interface (D-Sub 9, female).*

(B) RS 422/485

➜ Set INTERF. PARAM. > COM2 PORT > Serial Port Mode to „RS 422“ or „RS 485“.

➠ Pin assignment looked at from „PC point of view“ (Device = DCE)!

| Pin | Signal name (host) | Signal direction at the I/O board |
|---|---|---|
| 1 | | Not connected |
| 2 | Rx- | Out |
| 3 | Tx- | In |
| 4 | Termination [a] | |
| 5 | GND | |
| 6 | Termination [a)] | |
| 7 | Tx+ | In |
| 8 | Rx+ | Out |
| 9 | | Not connected |




*[Tab. 9] Pin assignment at the RS 422/485 interface (D-Sub, female).*

*a) 110 Ohm*

RS 422/485 termination

At the *last* printer at the RS 422/485 line, connect the following pins (inside of the cable connector):

- Pins 3 and 4 (Tx-)
- Pins 6 and 7 (Tx+)

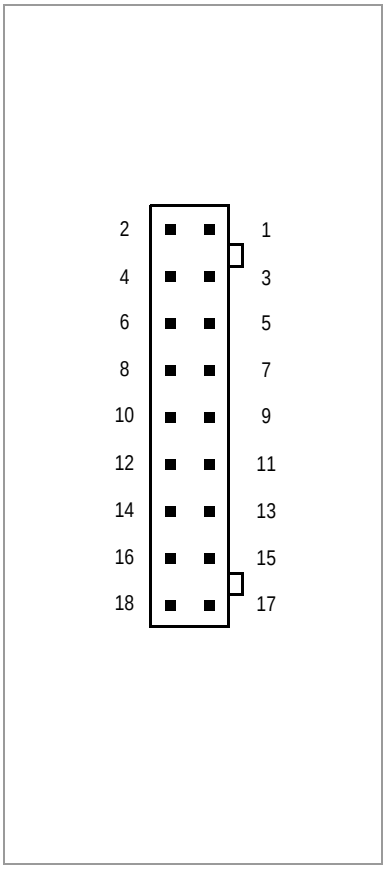
RS 485 2-wire connection

At *each* printer on the bus line, connect the following pins (inside of the cable connector):

- Pins 2 and 3 (Tx-/Rx-)
- Pins 7 and 8 (Tx+/Rx-)

(C) Connection CPU board

| Pin | Signal |
|---|---|
| 1 | GND |
| 2 | nREPRINT |
| 3 | FPGA_U4RX |
| 4 | nSTART |
| 5 | FPGA_U4TX |
| 6 | nFEED |
| 7 | GND |
| 8 | nPAUSE |
| 9 | FPGA_U4CTS |
| 10 | ERROR |
| 11 | FPGA_U4RTS |
| 12 | WARNING |
| 13 | GND |
| 14 | PRINTEND |
| 15 | +3,3V |
| 16 | +5V |
| 17 | DXEN |
| 18 | RS485_nRS323 |




*[Tab. 10] Pin assignment at the CN 101 connector.*

## Setting the Interface Parameters

With an I/O board mounted, the following additional menus appear in the printer menu:

- INTERF. PARAM. > COM2 PORT contains all parameters required to configure the serial interface.
- I/O BOARD contains all parameters required to configure the signal interface.

➠ The signal interface is not yet supported!

| Menu | Parameter | Setting | Comment |
|---|---|---|---|
| INTERF. PARAM. > COM2 PORT | Baud rate | 9600 | |
| | No. of data bits | 8 | |
| | Parity | None | |
| | Stop Bits | 1 | |
| | Data synch. | RTS/CTS | |
| | Serial Port Mode | RS 232 | |
| SYSTEM PARAMETER | External signal | Singlestart | |
| | Reprint function | Enabled | |
| I/O BOARD | Start delay | 0.0 mm | NOT YET SUPPORTED! |
| | Start print mode | Pulse falling | |
| | Reprint signal | Enabled | |
| | Feed | Standard | |
| | Pause input | Standard | |
| | Error output | Print error | |
| | Error polarity | Level low active | |
| | Status output | Print job ready | |
| | Status polarity | Level low active | |
| | End print mode | Mode3 low pulse | |

*[Tab. 11] Recommended parameter default settings.*

## Testing the Serial Interface

See parameter description of SERVICE FUNCTION > Com2 port test in topic section Info-Printouts & Parameters 🗋.

# Power Supplies

WARNING!

The outputs of the power supplies are energy hazard. Touching the output connectors with the machine switched on can cause exposure to hazardous electrical currents and may lead to burns.

➜ Switch off the machine before touching the power supply.

WARNING!

Risk of burn injuries caused by a hot power supply.

➜ Only operate the power supply if it is built in into the printer housing.
➜ Let the power supply cool down before removing it.

## Application Notes

The following two types of power supplies are applied:

| Printer | Power supply |
|---|---|
| 64-04/05/06 | Up to 01/2008: NT400<br>Since 01/2008 ME500 |
| 64-08, DPM, PEM, PM 3000, ALX 92x | HME |

*[Tab. 12] Application of the two power supply types.*

For article numbers refer to the Spare Part Catalog 🗋 .

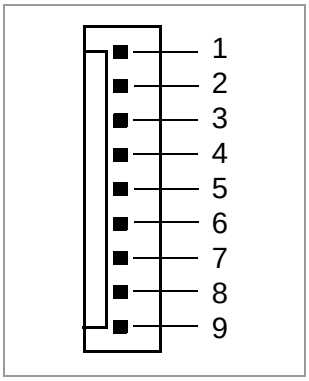
## NT400 (A1680)

➠ The NT400 is discontinued since 01/2008. It is replaced by the ME500 (see next chapter).

> WARNING!
> Fire hazard by overheating.
> ➜ This power supply *must not* be applied with a dust filter.

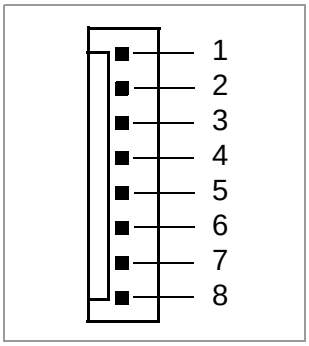
**A** CPU board connection (control signals)

| Pin | Function |
|---|---|
| 1 | NMI |
| 2 | ICS |
| 3 | ISK |
| 4 | I/O |
| 5 | TK |
| 6 | KA |
| 7 | KD |
| 8 | KS |
| 9 | GND |



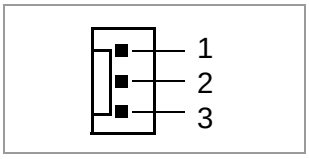

**B** Printhead connection

| Pin | Function |
|---|---|
| 1 | 20-28 V |
| 2 | 20-28 V |
| 3 | 20-28 V |
| 4 | 20-28 V |
| 5 | GND |
| 6 | GND |
| 7 | GND |
| 8 | GND |



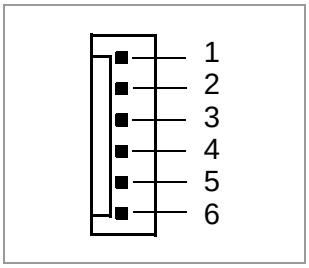

**C** CPU board connection (supply voltage) / Logic

| Pin | Function |
|---|---|
| 1 | GND |
| 2 | +5 V |
| 3 | GND |




**D** Output stage boards connection

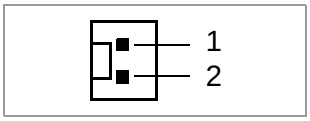
| Pin | Function |
|---|---|
| 1 | 5 V |
| 2 | 0 V |
| 3 | 38 V |
| 4 | 0 V |
| 5 | 52 V |
| 6 | 0 V |



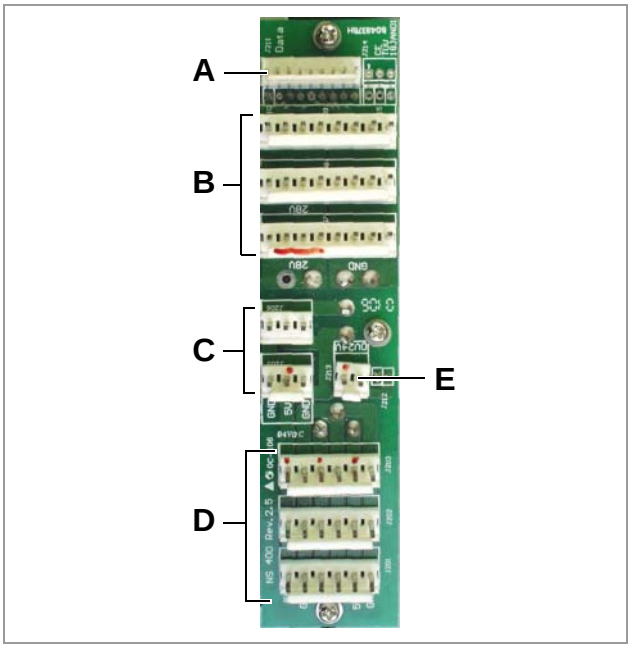

**E** USI board (optional)

| Pin | Function |
|---|---|
| 1 | +24 V [a] |
| 2 | GND |

*a) galvanically separated*



[32] Power supply NT400.




[33] Connections at the NT400.

## ME500

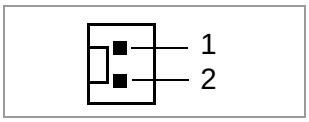
- The ME500 replaces the NT400 since 01/2008.
- Retrofitting printers with Gen. 3 electronics is possible without further modifications.
- Operation with dust filter is admissible. Part number of the dust filter kit see spare parts catalog. Mounting instructions for the dust filter kit: see topic section Service Mechanics, chapter „Assembling accessories“.

➠ Wait at least 15 s between switching off and on again.

**A** Remote on/off

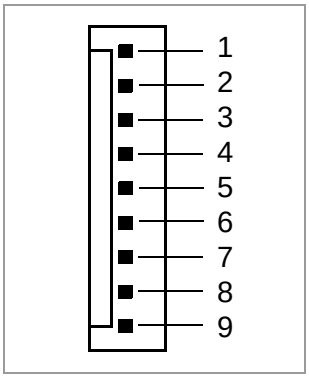
➠ 64-xx: bridge the connector using a jumper.

| Pin | Function |
|---|---|
| 1 | On/off |
| 2 | GND |



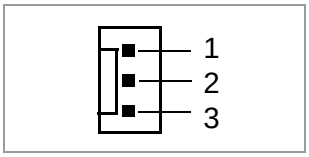

**B** CPU board connection (control signals)

| Pin | Function |
|---|---|
| 1 | NMI |
| 2 | I2C detect |
| 3 | SCL |
| 4 | SDA |
| 5 | PG |
| 6 | n. a. |
| 7 | n. a. |
| 8 | n. a. |
| 9 | GND |




**C** CPU board connection (supply voltage) / Logic

| Pin | Function |
|---|---|
| 1 | GND |
| 2 | +5 V |
| 3 | GND |

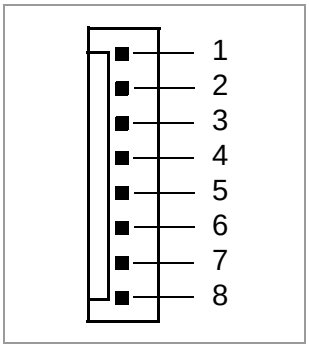



**D** Ground connection

➠ The cable end must be screwed to the printer housing.

**E** Printhead connection

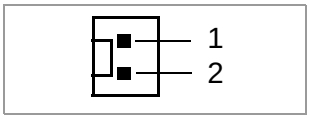
| Pin | Function |
|---|---|
| 1 | 20-28 V |
| 2 | 20-28 V |
| 3 | 20-28 V |
| 4 | 20-28 V |
| 5 | GND |
| 6 | GND |
| 7 | GND |
| 8 | GND |




**F** Operation indicator

**G** USI board (optional)

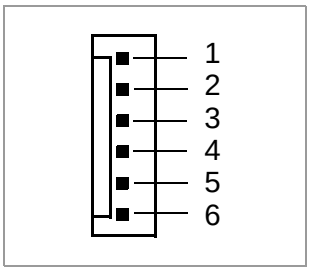
| Pin | Function |
|---|---|
| 1 | +24 V |
| 2 | GND_24V [a] |



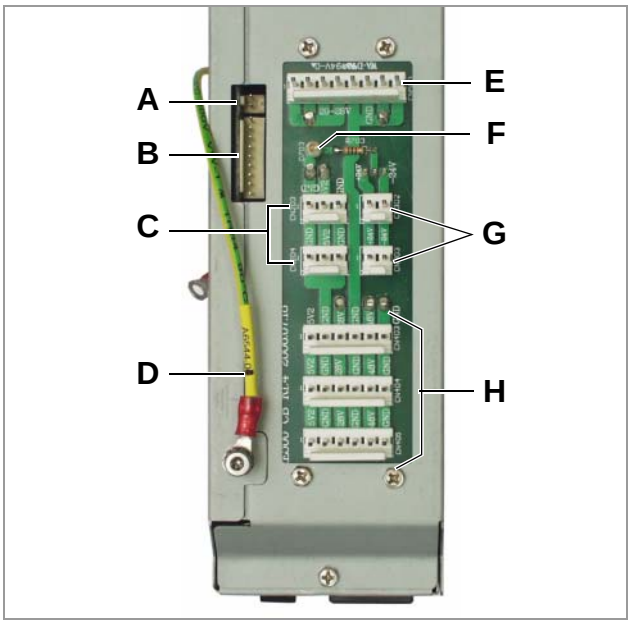

*a) Galvanically separated*

**H** Output stage boards connection

| Pin | Function |
|---|---|
| 1 | 5,2 V |
| 2 | GND |
| 3 | 28 V |
| 4 | GND |
| 5 | 48 V |
| 6 | GND |



[34] Power supply ME500.




[35] Connections at the ME500.

## HME

- Operation with dust filter is admissible.
- Part number of the dust filter kit see spare parts catalog.
- Mounting instructions for the dust filter kit: see topic section Service Mechanics, chapter „Assembling accessories“.

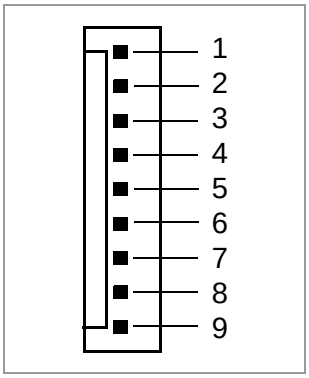
**A** Applicator Interface connection

**B** Ground connection

➠ The cable end must be screwed to the printer housing.

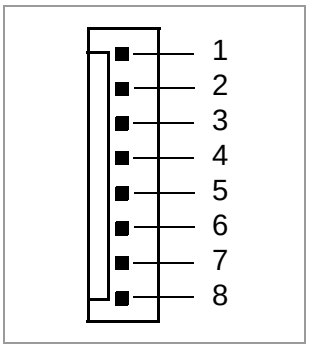
**C** CPU board connection (control signals)

| Pin | Function |
|---|---|
| 1 | NMI |
| 2 | I2C detect |
| 3 | SCL |
| 4 | SDA |
| 5 | PG |
| 6 | n. a. |
| 7 | n. a. |
| 8 | n. a. |
| 9 | GND |



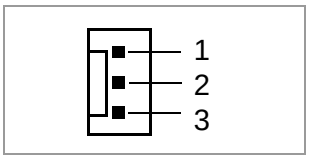

**D** Printhead connection

| Pin | Function |
|---|---|
| 1 | 20-28 V |
| 2 | 20-28 V |
| 3 | 20-28 V |
| 4 | 20-28 V |
| 5 | GND |
| 6 | GND |
| 7 | GND |
| 8 | GND |



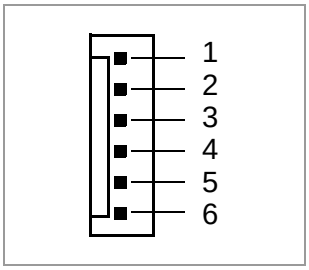

**E** CPU board connection (supply voltage) / Logic

| Pin | Function |
|---|---|
| 1 | GND |
| 2 | +5 V |
| 3 | GND |




**F** Output stage boards connection

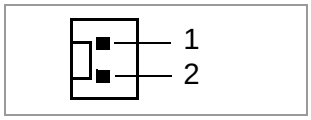
| Pin | Function |
|---|---|
| 1 | +5 V |
| 2 | GND |
| 3 | n. b. |
| 4 | GND |
| 5 | +48 V |
| 6 | GND |




**G** Remote on/off

➠ 64-xx: bridge the connector using a jumper.

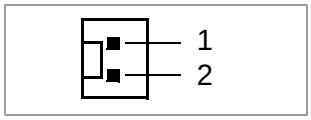
| Pin | Function |
|---|---|
| 1 | On/off |
| 2 | GND |

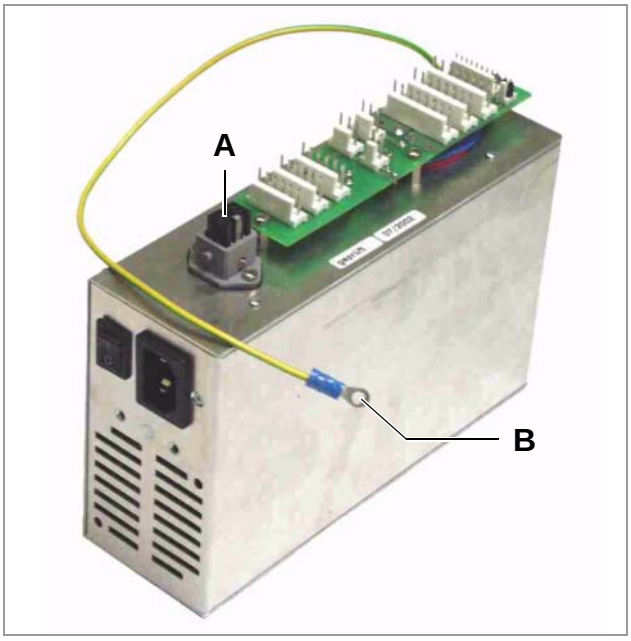



**H** CPU board connection (supply voltage, only ALX 92x/DPM) / USI board (optional)

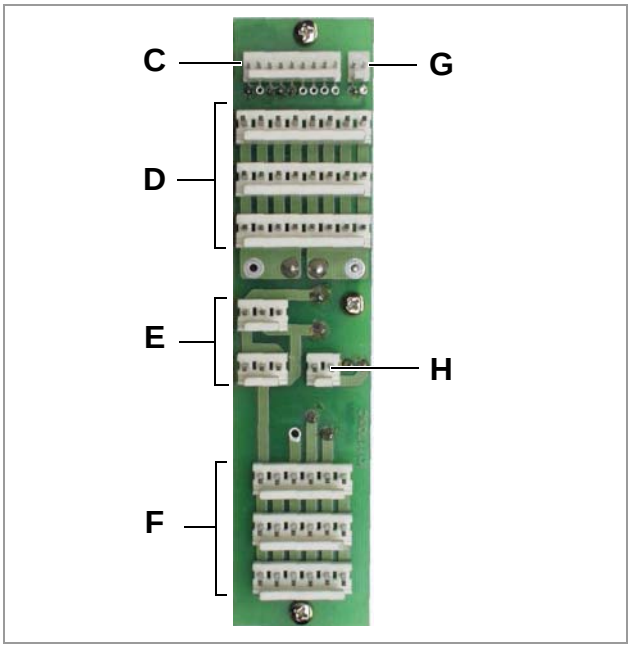
| Pin | Function |
|---|---|
| 1 | +24 V |
| 2 | GND_24V [a] |

*a) Galvanically separated*




[36] Power supply HME.




[37] Connections at the HME.

## Printhead Voltages HME & Standard

| Printhead resistance / Ohm | Printh. Voltage / V | Printhead resistance / Ohm | Printh. Voltage / V | Printhead resistance / Ohm | Printh. Voltage / V | Printhead resistance / Ohm | Printh. Voltage / V |
|---|---|---|---|---|---|---|---|
| 1000 | 21,40 | 1190 | 23,30 | 1380 | 25,05 | 1570 | 26,68 |
| 1010 | 21,50 | 1200 | 23,39 | 1390 | 25,14 | 1580 | 26,77 |
| 1020 | 21,61 | 1210 | 23,49 | 1400 | 25,23 | 1590 | 26,85 |
| 1030 | 21,71 | 1220 | 23,58 | 1410 | 25,31 | 1600 | 26,93 |
| 1040 | 21,81 | 1230 | 23,68 | 1420 | 25,40 | 1610 | 27,01 |
| 1050 | 21,92 | 1240 | 23,77 | 1430 | 25,49 | 1620 | 27,10 |
| 1060 | 22,02 | 1250 | 23,87 | 1440 | 25,58 | 1630 | 27,18 |
| 1070 | 22,12 | 1260 | 23,96 | 1450 | 25,66 | 1640 | 27,26 |
| 1080 | 22,22 | 1270 | 24,05 | 1460 | 25,75 | 1650 | 27,34 |
| 1090 | 22,32 | 1280 | 24,14 | 1470 | 25,84 | 1660 | 27,42 |
| 1100 | 22,42 | 1290 | 24,24 | 1480 | 25,92 | 1670 | 27,50 |
| 1110 | 22,52 | 1300 | 24,33 | 1490 | 26,01 | 1680 | 27,58 |
| 1120 | 22,62 | 1310 | 24,42 | 1500 | 26,09 | 1690 | 27,66 |
| 1130 | 22,72 | 1320 | 24,51 | 1510 | 26,18 | 1700 | 27,74 |
| 1140 | 22,81 | 1330 | 24,60 | 1520 | 26,26 | 1710 | 27,82 |
| 1150 | 22,91 | 1340 | 24,69 | 1530 | 26,35 | 1720 | 27,90 |
| 1160 | 23,01 | 1350 | 24,78 | 1540 | 26,43 | 1730 | 27,98 |
| 1170 | 23,11 | 1360 | 24,87 | 1550 | 26,52 | | |
| 1180 | 23,20 | 1370 | 24,96 | 1560 | 26,60 | | |

*[Tab. 1] The table shows the voltages which the power supply should provide, if it is connected to a printhead with the respective resistance. The values are valid for both, Standard and HME power supply.*

### Checking the head-voltage

Proceed as follows to check the printhead voltage:

1. Find out the printhead resistance.

➠ The printhead resistance can be found written on the printhead or by calling the parameter SYSTEM PARAMETERS > Head resistance (Given, that the resistance value is typed in correctly).

2. Measure the printhead voltage at the power supply with a voltmeter and compare the result with the value in the table.

➠ Maximum admissible deviation: +/- 0.2V!

## Characteristics HME power supply

### Inputs

| Characteristic | Value |
|---|---|
| Range of input voltage | 100-240VAC |
| Admissible range of deviation | 88-264VAC |
| Frequency range | 50-60Hz |
| Admissible range of frequency | 47-63Hz |

*[Tab. 2] Characteristics of the input voltages.*

### Outputs

| Characteristic | Outputs | | | |
|---|---|---|---|---|
| | 1 | 2 | 3 | 4 |
| Output voltages ($U_{nom}$) | 5V | 24V | 24V | 48V |
| Setting range | | 20-28V | | |
| Output currents ($I_{nom}$) | 2.7A | 6.3A | 1.5A | 5.2A |
| Max. output currents ($I_{peak}$) | | 10A | | 7.3A (t<=10s) |
| Pulsed output current ($I_{puls}$) | | 40A (50% ED; t<=0.5ms) | | |
| Tolerance | ±2.5% | ±5% | ±10% | +5% / -10% |

*[Tab. 3] Characteristics of the output voltages.*

➠ The total power of the outputs 2 and 4 may not exceed 250W!
➠ Output 2: May only be activated by an $I^2C$-bus-command!

### AC output

| Characteristic | AC output |
|---|---|
| Output voltage | max. 250V(AC) |
| Output current at 230VAC | max. 4A(AC) |
| Output current at 110VAC | max. 1A(AC) |

*[Tab. 4] Characteristics of the AC output.*

The AC output of the HME power supply is internally protected together with the power supply input by one single fuse (6.3A). The input current of the HME power supply depends on the application as well as on the mains voltage. Therefore, there can be drawn a maximum current of 4A(AC) at 230V and 1A(AC) at 110V from the power supply.

# OD control sensor (ALX)

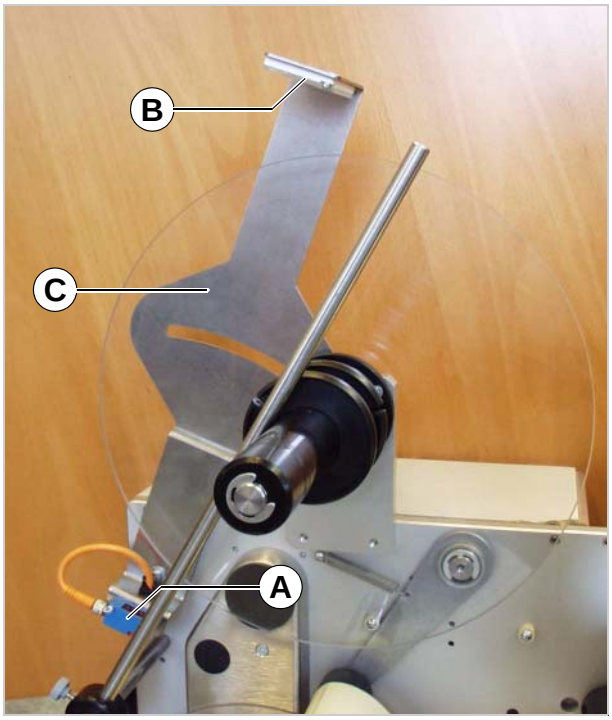
OD control = short for "outside diameter control of the label roll".

## Function

When the label roll is full, it interrupts the light beam between the sensor [38A] and the reflector [38B] in the sensor unit. As soon as the label roll is unwound to a certain diameter, the light beam can reach the reflector. The light barrier sensor then sends a signal to the USI, which then activates a warning signal to a signal output.

The critical diameter is set by moving the bracket [38C] which is fastened at the bottom to the ALX base plate.

➠ A switching range of around 1-2 m material length may arise due to the label roll moving as it is being unrolled; i.e. the light barrier sensor and thus the WARNING signal may be activated several times within this range.




[38] ALX 92x (RH) with OD control
**A** Sensor
**B** Reflector
**C** Bracket

## System requirements

**Operation at USI**

- ALX 92x
- OD-sensor assy. for USI (A3523)
- USI Version 4 (A2345-04, 24 V) with USI Controller V2-T1-F873
- Printer firmware version 2.46 or higher

See chapter Assembling the OD-sensor on page 41 and chapter Connecting the OD-sensor to USI on page 44.

**Operation at AI**

- ALX 92x
- OD-sensor assy. for AI (A5293)

See chapter Assembling the OD-sensor on page 41 and chapter Connecting the OD-sensor to AI on page 43.

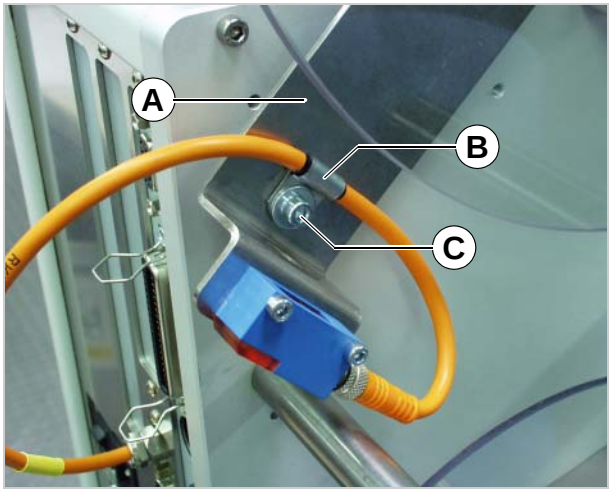
## Assembling the OD-sensor

1. Remove rear hood, see topic section Service Mechanics, chapter „Rear hood (ALX)“.

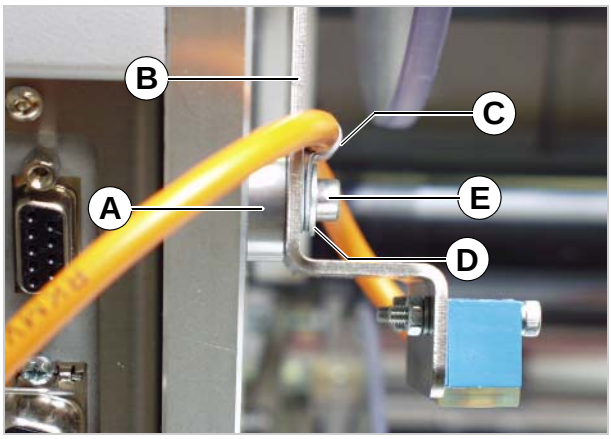
➠ For operation with an AI, the connection cable may have to be replaced before assembling the sensor, see chapter Connecting the OD-sensor to AI on page 43.

2. Fix OD bracket [39A] and cable clamp [39B] to the base plate with a M4 hexagon socket screw and shim [40].

➠ Insert aluminium disc [40A] between bracket and base plate!
➠ Attach cable clamp to the marked point on the cable!
➠ Ensure sufficient distance is retained between the light barrier sensor cable and the material guide plate!



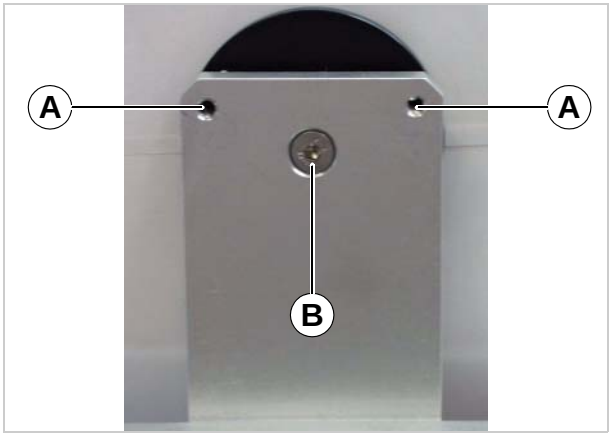

[39] Fixing the OD check system.
**A** Bracket
**B** Cable clamp
**C** M4 hexagon socket screw




[40] Sequence of assembly on the OD bracket:
**A** Aluminium disc
**B** Bracket
**C** Cable clamp
**D** Disc
**E** Screw

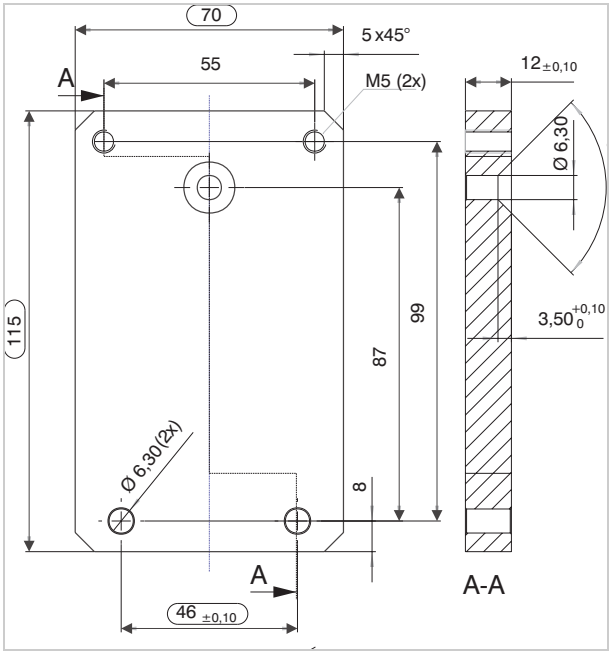
3. Ensure that the holding plate has the characteristics described in [41].

➠ The threaded holes [41A] for the wing screw are only implemented from the following delivery date/serial number:
– ALX 924: 05/2002
– ALX 925: 05/2002
– ALX 926: 0358610204-ALX926




[41] The material roller holding plate must have the following characteristics:
**A** Threaded holes
**B** Counter bore (material unwinder axle must be fixed with a countersunk screw)

➠ The holding plate with threaded holes and counter bore can be ordered under the order number A2794 for fitting onto older machines. Alternatively, the threaded holes and the counter bore can be implemented on the existing plate.




[42] Holding plate dimensions

4. Screw the OD bracket onto the holding plate with the wing screw and shim[43].

[43] Screw the OD bracket onto the holding plate.

## Connecting the OD-sensor to AI

➜ Plug the D-Sub 26 connector [44A] to the centre connection (machine status) at the AI.

**Alternatives**
An already available OD-sensor assy. for USI can be modified for use with an AI by doing the following:

➜ Exchange the shipped cable by the cable A5292.

or:

➜ Connect the D-Sub 26 connector to the cable according to the table right.

The „AI connector kit“ (A5069), contains (connector and housing each):
– 1x D-Sub 15 high density
– 1x D-Sub 26 high density
– 1x D-Sub 44 high density

Also see topic section Applicator Interface 🗋.

[44] OD-sensor assy. for AI (A5293).

| Wire colour | Pin at D-Sub 26 | Function |
|---|---|---|
| Brown | 14<br>23 | +24 V<br>A |
| Blue | 15 | GND |
| Black | 24 | K |

*[Tab. 5] Pin assignment at the D-Sub 26 connector (NPN).*

## Connecting the OD-sensor to USI

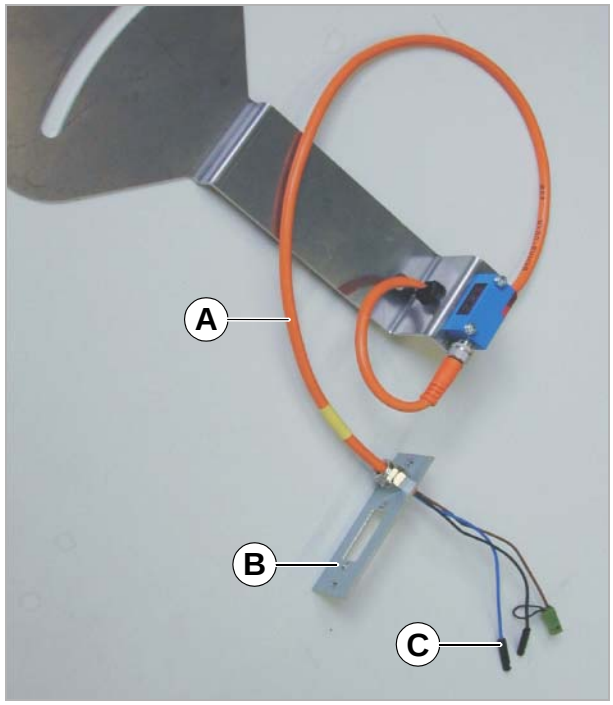
| Wire colour | Function |
|---|---|
| Brown | +24 V<br>A |
| Blue | GND |
| Black | K |

*[Tab. 6] Pin assignment at the OD-sensor cable.*

Also see topic section Electronics, chapter „USI board“.

**Tools**

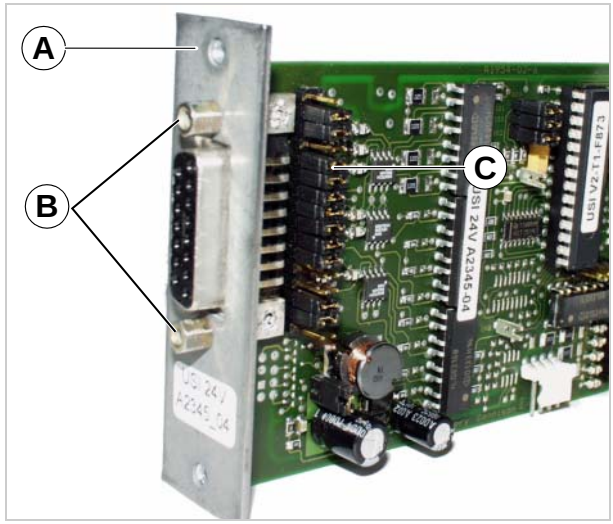
- 2 mm allen key
- Size 5 socket wrench




[45] OD-sensor assy. for USI (A3523).

**Preparing the USI board**

1. Disconnect and dismantle the USI board [46].
2. Disconnect the third connected jumper [46C] from the jumper strip.
3. Unscrew board plate [46A]. To do this unscrew the two screws [46B].




[46] USI board

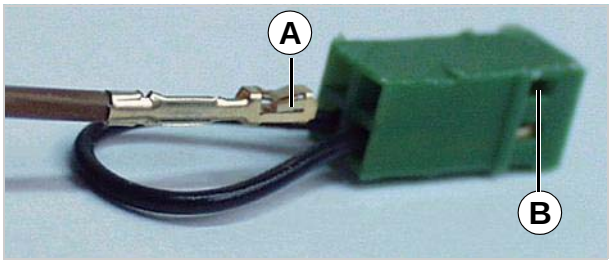
**Preparing the light barrier sensor cable**

➠ Steps 4, 5 and 6: The contact springs [47A][48A] must engage in the bushing housing cutouts [47B][48B]!

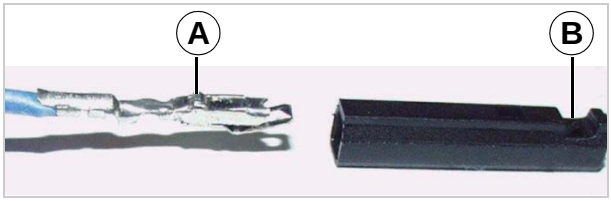
4. *Insert the brown* lead of the light barrier sensor cable into the 4-pin bushing housing as shown [47].
5. *Insert the blue* lead of the light barrier sensor cable into one of the 1-pin bushing housings as shown [48].
6. *Insert the black* lead of the light barrier sensor cable into the other 1-pin bushing socket in the same way.
7. Thread the light barrier sensor cable leads [49A] through the opening in the housing.
8. Lead the board plate mounted on the light barrier sensor cable [49B] through the opening in the housing, rotating it slightly.
9. Screw the plate board [50A] onto the housing (2 screws).

➠ The photo [50] shows assembly on a RH machine. On LH machines, the plate board is mounted rotated through 180×!

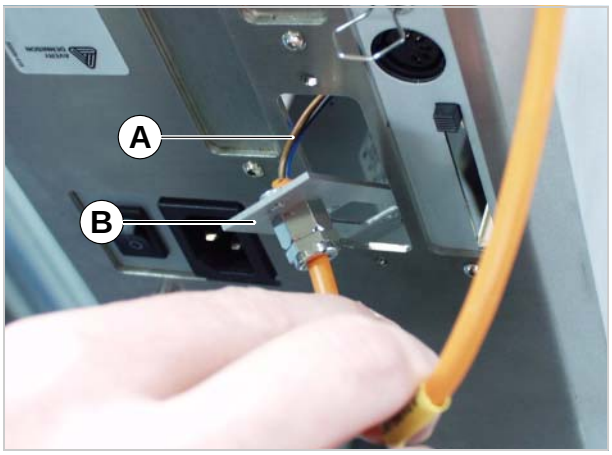
Continued overleaf.



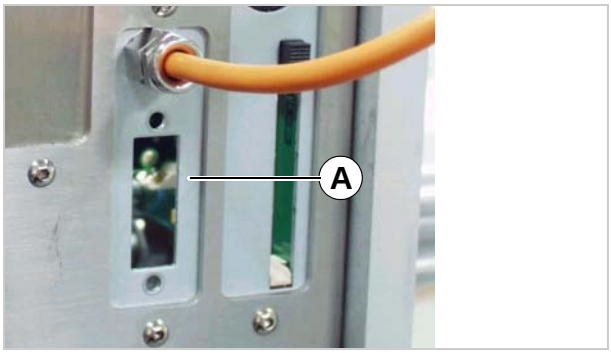

[47] Insert the spring contact into the 4-pin bushing housing.




[48] Insert the spring contact into the 1-pin bushing housing.




[49] Insert the board plate into the side panel through the opening.

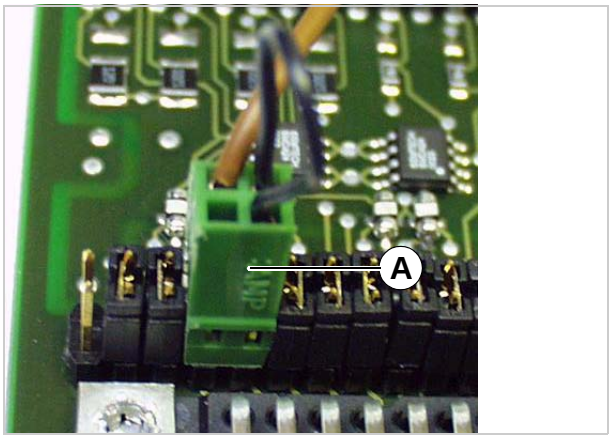



[50] Screw on the board plate (ALX/RH).

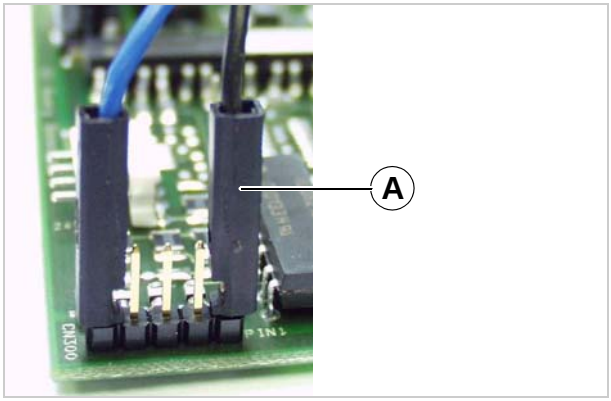
**Connecting the light barrier sensor cable**

10. Connect the three leads to the USI board [51][52].

➠ Push the plugs onto the pins as far as they will go!



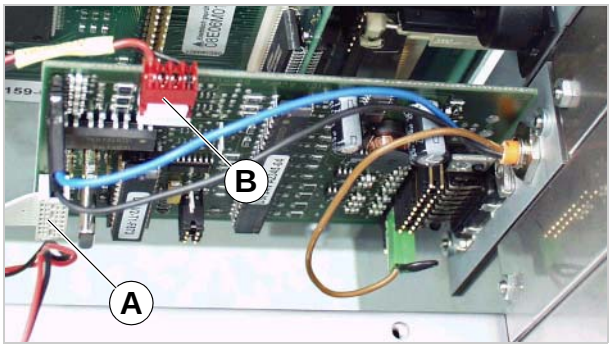

[51] Insert the leads (A) on the USI board.




[52] Plug the leads (A) into the USI board.

**Mounting the USI board**

11. Screw the USI board onto the board plate [53].
12. Connect the ribbon cable [53A] and 2-pin cable [53B] and the USI board.




[53] Mount the USI board.

## Connecting the OD-sensor to USI (with applicator PLC)

In ALX 92x with PLC control for applicators, the cable leads for the light barrier sensor are attached to a different location than that described in the previous section.

**Tools**

- 2 mm allen key
- Size 5 socket wrench

**Preparing the USI board**

1. Disconnect and dismantle the USI board.
2. Unplug the PLC cable plug [54A].
3. Unscrew board plate [54B].

**Preparing the cable for the light barrier sensor**

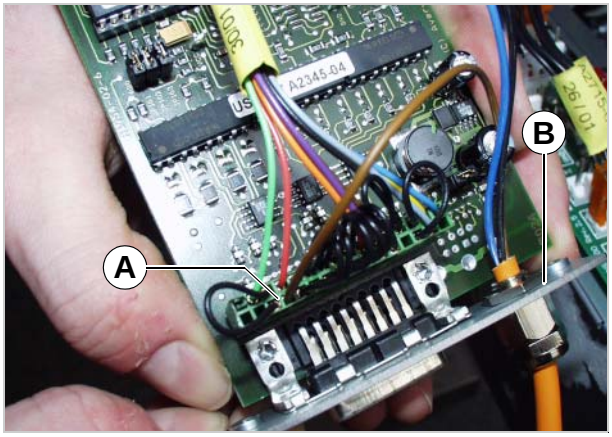
4. Thread the sensor cable leads through the opening in the housing.
5. Lead the board plate mounted on the sensor cable through the opening in the housing, rotating it slightly.

   For photos see chapter Preparing the light barrier sensor cable on page 45.

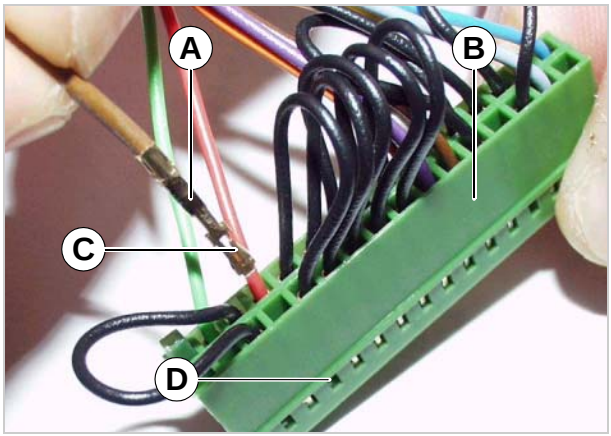
➠ Steps 6, 7 and 8: The contact spring [55C][56B] must engage in the cutout [55D][56A] in the plug housing!

6. *Insert the brown* lead as shown [55] into the 30-pin PLC connection cable plug.

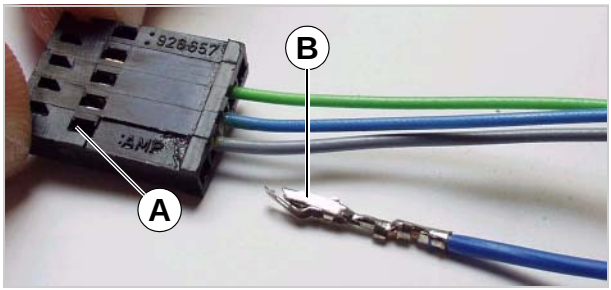
7. *Insert the blue* lead as shown [56] into the 5-pin PLC connection cable bushing housing.




[54] Dismantled USI board (the PLC connection cable (A) is connected).

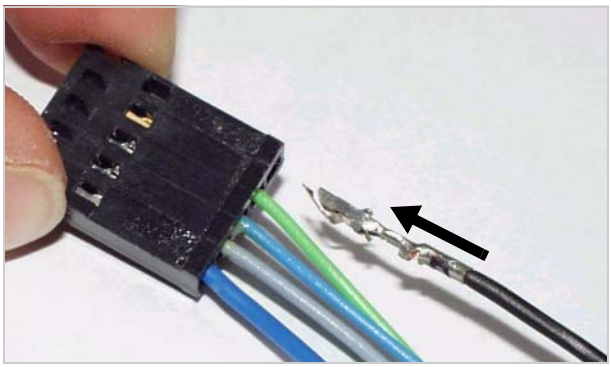



[55] Insert the brown sensor cable lead (A) in the PLC connection cable plug (B). The contact spring (C) must engage in the cutout (D).




[56] Insert the blue sensor cable lead.

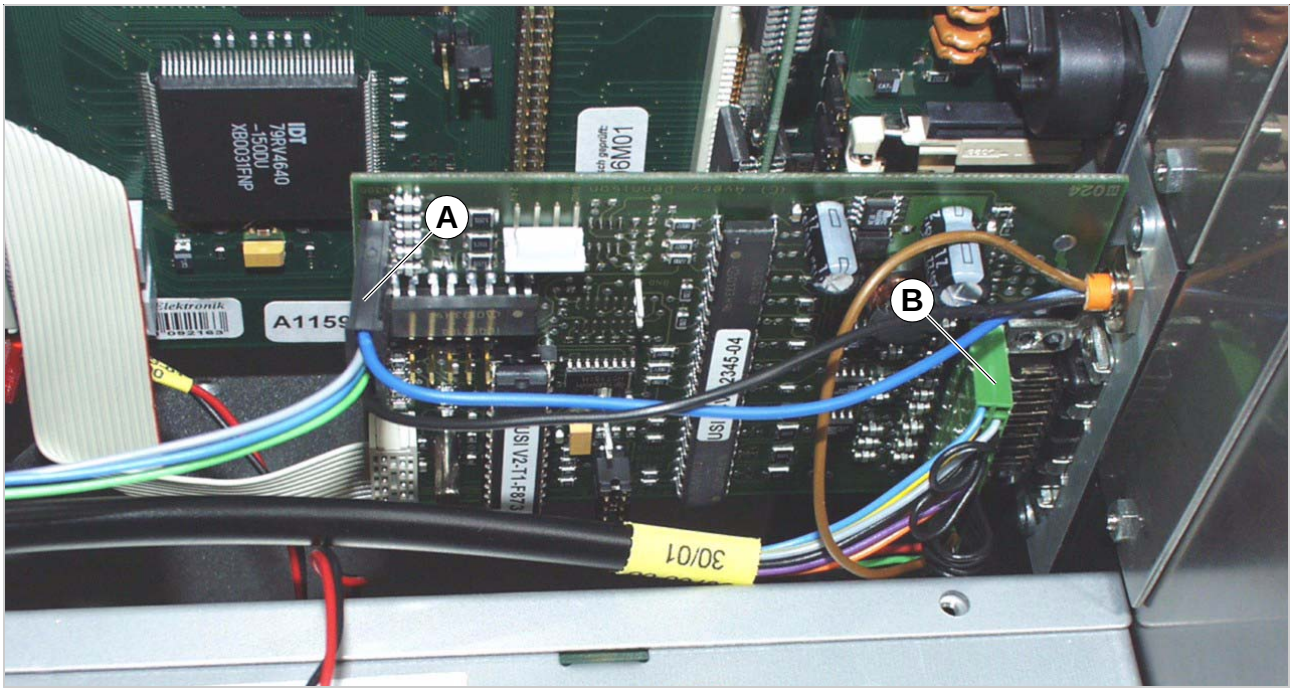
8. *Insert the black* lead as shown [57] also into the 5-pin PLC connection cable bushing housing.



[57] Insert the black sensor cable lead.

**Connecting the sensor cable**

9. Connect both PLC connection cables [58A, B] to the USI board.




[58] PLC connection cable plugged into the USI board (ALX/RH):
**A** 5-pin plug
**B** 30-pin plug

**Mounting the USI board**

See topic section Service Mechanics 🗋, chapter „Mounting the USI board“.

# Settings

## Material end / Label sensors

➠ The button designations mentioned in this description count for DPM, PEM, PM 3000 or ALX 92x. For 64-xx printers, please press the *Cut* button instead of the *Apply* button!

LS

LS means light sensor.

1. Switch on the printer while you keep the Feed and Prog buttons pressed for approx. 5 s. After the printer has started, „Enter code“ is displayed.
2. Press the following buttons one after the other:
   *Apply, Online, Feed, Apply,* 3x *Online*.
3. Call SERVICE FUNCTION > Sesor adjust.

Material-end-LS

This text is displayed:

```
Sensor adjust
x   Matend   y
```

- x = setting value of the LED current
- y = value measured by the sensor. The measurement is interpreted by the electronics as follows:
  $y < 128$ : No material inserted
  $y \geq 128$ : Material inserted

➠ The higher the setting value, the lower is the measured value.

1. Remove the label material from the LS.
2. Set y to approx. 100 using the Apply or Feed buttons.
   Typical x values with this setting are:
   – 95 with 64-xx
   – 55 with DPM / PEM / PM 3000 / ALS 92x
3. Insert some backing paper; y must rise now to a value clearly above 128 (at least 138).

➠ If y is below 138: Increase the setting without material step by step, until the value with backing paper shows at least 138.

4. Press the online button to save the setting.

Punch LS

Now, the settings of the punch sensor are displayed:

```
Sensor adjust
x   Punch   y
```

x: setting value of the LED current.
y: value measured by the sensor.

1. Insert some backing paper of standard label material (with the labels peeled off), to check the sensor measurement.

➠ The material sample must be big enough to cover the LS!

2. Set x so that y matches the range of 25..40.
   Typical x values with this setting are:
   – 75 with 64-xx
   – 110 with DPM / PEM / PM 3000 / ALS 92x
3. Insert standard self-adhesive material (paper label on backing paper) into the printer.

➠ y should now count at least 100 digits *higher* than the value measured with bare backing paper.

4. If y doesn´t match this range: modify the x value by pressing the Apply or Feed button.
5. Press the online button to save the setting.

   By doing so, the punch sensor is ready set.

Reflex LS

Now, the settings of the reflex sensor are displayed:

```
Sensor adjust
x   Reflex   y
```

x: setting value of the LED current.
y: value measured by the sensor.

➠ The reflex LS is an *option*. If the printer is not equipped with a reflex LS, skip this section by pressing the online button!

1. Push the reflex mark on the label material over the reflex LS.
2. Set x so that y matches the range of 230..255.
   Typical x values with this setting are:
   – 200 with 64-xx
   – 155 with DPM / PEM / PM 3000 / ALS 92x
3. Position the label material with an area without reflex mark over the reflex LS. The measured value should now...
   – match the range of 25..100 and
   – lie at least 100 digits below the value measured with reflex mark.
4. If y doesn´t match this range: modify the x value by pressing the Apply or Feed button.
5. Press the online button to save the setting.

   By doing so, the reflex sensor is ready set.

Fullsize LS

Now, the settings of the Fullsize sensor are displayed:

```
Sensor adjust
x   Fullsz   y
```

x: setting value of the LED current.
y: value measured by the sensor.

➠ The Fullsize LS is an *option*. If the printer is not equipped with a Fullsize LS, skip this section by pressing the online button!

1. Insert some backing paper of standard label material (with the labels peeled off), to check the sensor measurement.

➠ The material sample must be big enough to cover the LS!

2. Set x so that y matches the range of 25..70.
3. Insert standard self-adhesive material (paper label on backing paper) into the printer.

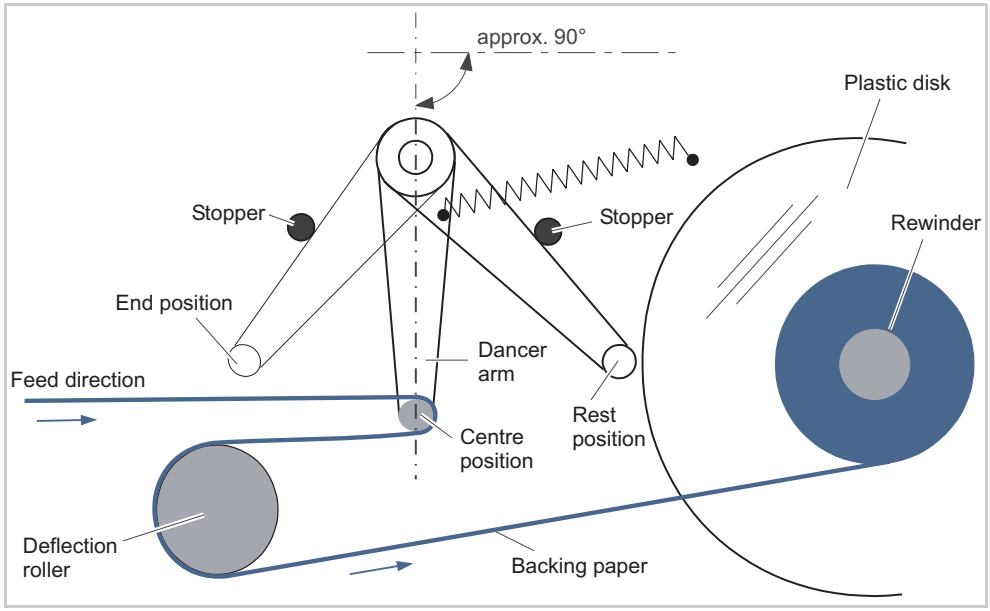
➠ y should count at least 100 digits *higher* than the y value measured with bare backing paper.

4. If y doesn´t match this range: modify the x value by pressing the Apply or Feed button.
5. Press the online button to save the setting.

   By doing so, the Fullsize LS is ready set.

## Light sensor rewinder dancer arm (ALX)

The backing paper dancer lever controls the speed at which the backing paper is unwound. The winder rotates fastest when the dancer lever is in *resting position*. The unwinder rotates more slowly the more the dancer lever is moved out, until it comes to a stop in the *center position*. The dancer lever needs the area between the center position and *end position* , when the printer is transporting the label strip backwards.




*[1] Schematic picture of the rewinder dancer arm at an ALX LH.*

### Check setting

Preconditions:
– Dancer arm is in rest position
– Backing paper is removed from the rewinder

1. Call SERVICE FUNCTIONS > Sensor test. Press the Apply button repeatedly, until the sensor with the ID 5.01 appears:

| | |
|---|---|
| Sensor test<br>5.01 Option xxx | xxx = LS value |

2. Move the dancer arm from the rest position to the end position (spring extended) [1]. While doing so, watch the sensor values in both positions.

   The value range must be at least 130:

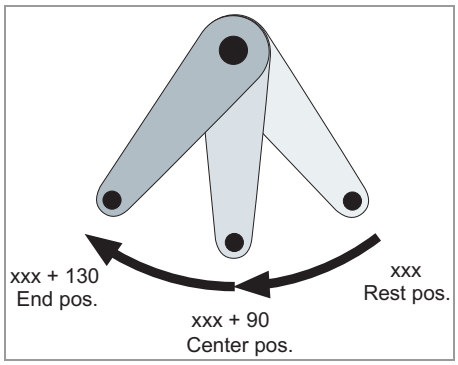
   $$Valuerange = xxx_{Endpos} - xxx_{Restpos}$$

   If the value range is less than 130, the dancer arm sensor must be set newly (see next section).

3. To leave the menu, press the Esc button repeatedly.

## Setting the sensor

Preconditions:
– Rear hood is dismantled
– Backing paper is removed from the rewinder
➠ During the setting, make sure, that no extraneous light is falling on the dancer arm sensor [3B].

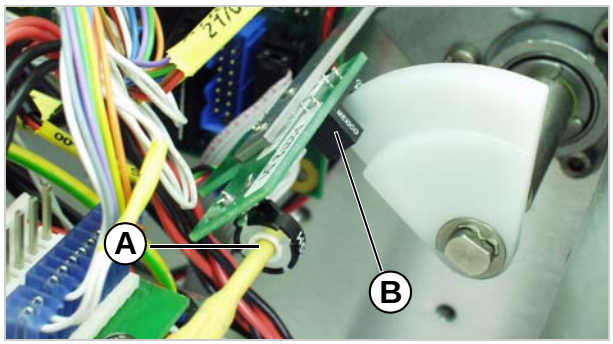



*[2] Setting positions of the rewinder dancer arm (schematic, ALX LH)*

1. Call SERVICE FUNCTION > Rewinder adjust:

| | |
|---|---|
| Rewinder adjust | |
| Resting pos. | xxx |

2. Move the dancer arm from the *rest position* over the *center position* to the *end position*. While doing so, watch the value xxx. Check, if the values match the scheme pictured in [2].
3. If the values don´t match the scheme: Set the potentiometer [3A] so, that xxx in the *center position* is at least *90* increments higher and in the *end position* at least *130* increments higher than the value in the rest position.




*[3] Setting potentiometer (A) of the dancer arm sensor (B).*

## Taking over the setting

4. Move the dancer arm to the *rest position* [2] again. Press the *Apply button*:

| | |
|---|---|
| Rewinder adjust | |
| Center pos. | xxx |

5. Move the dancer arm to the *center position* (dancer arm vertical) [2] and hold it there. Press the *Online button*.
6. Restart the device.

The sensor is ready set. If the required values are *not* successfully setable, the sensor board must be replaced.

See topic section Mechanics, section „Material transport“, „Dancer lever sensor“.

## Adjusting the imprint position

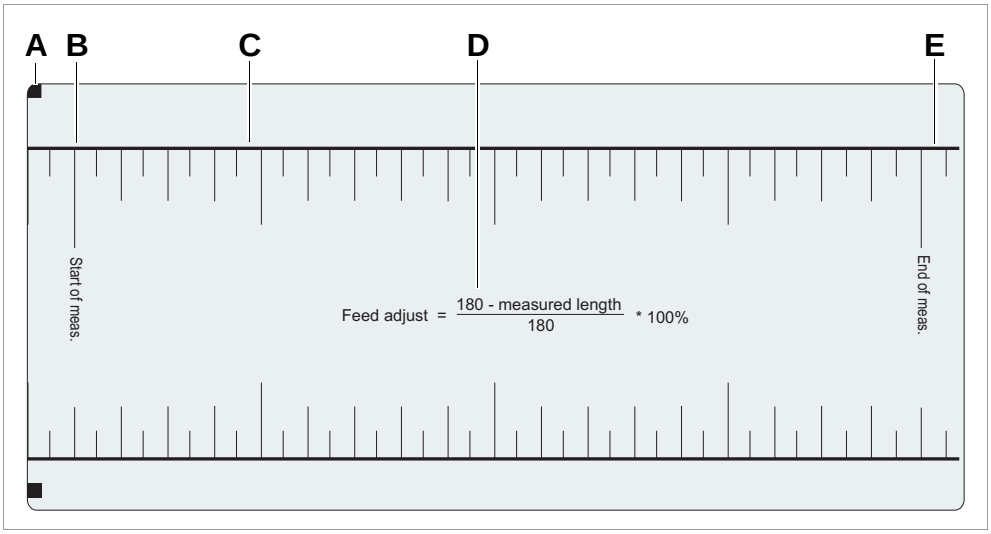
Printing on especially long labels may require under certain circumstances, that the imprint position has to be adjusted. Do this in the following way:

**Prerequisites**

- PRINT PARAMETERS > Punch Offset = „0 mm“.
- PRINT PARAMETERS > Print direction = „Foot first“.
- Required label material: minimum length 100 mm, best are 200 mm.
- Printer is in production mode.

**Compensating length misalignment**

1. Insert recommended label material. Print a feedadjust label (call SERVICE FUNCTION > Feedadjust label).




*[4] Feedadjust label with printed-on measure scale (C) and calculation scheme (D).*

2. Measure the distance between the two marks „Start of meas.“ [4B] and „End of meas.“ [4E].
3. Put the measured distance into the calculation scheme:

$$Feedadjust = \frac{180 - measuredLength}{180} \cdot 100 \quad \%$$

4. Calculate „Feedadjust“. Put the result into SERVICE FUNCTION > Feedadjust (the following parameter).
5. Print another feedadjust label. Check, if the black squares [4A] or the first line of the scale are printed exactly on the label edge. If this is not the case, proceed step 6:
6. Measure the distance between the black squares and the label front edge. Put the value into SERVICE FUNCTION > Punch y calibr.. Repeat steps 5 and 6, until the black squares exactly flush the label front edge.

**Compensating impression misalignment**

1. Print a feedadjust label (call SERVICE FUNCTION > Feedadjust label).
2. Measure the distance between leading label edge and „Start of meas.“ line.
3. Identify the deviation from the target value (10 mm) and type it in under SERVICE FUNCTION > Punch y calibr.
   ➠ Positive values shift the print image *against* feed direction, negative values shift it *in* feed direction.
4. Print feedadjust label and check it. If necessary, repeat steps 2 and 3.

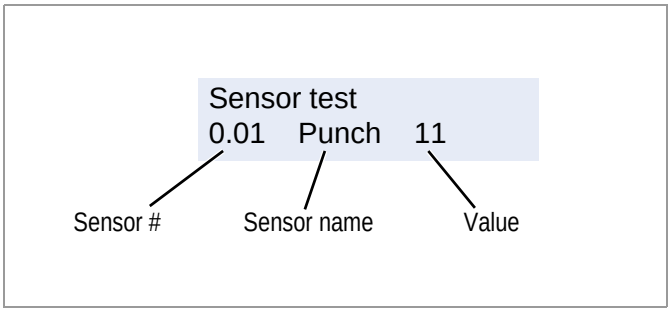
# Sensor test

## General notes

➜ Activating the sensor test: call parameter SERVICE FUNCTION > Sensor test.

By means of the sensor test, you can check the function of each sensor:

- If the value shown on the printer display exceeds the range given in the chart below, the respective sensor is possibly dirty and has to be cleaned (blow the dirt off with compressed air).
- Check the function of light barriers by covering it, and of micro switches by triggering it. If the displayed value doesn´t change when the sensor is covered or switched, it is possibly or defective.
- Sensors which are not connected show values about 255 in the sensor test.
- General rule for all sensor values:
  – Full light leads to values <= 10
  – No light leads to values >= 220
- To sensors which function as a switch applies the following: Values between 10 and 220 mean that the sensor is poorly set, dirty or close to the end of its life.




*[5] Display after calling „Sensor test“.*

➠ Extraneous light must be avoided when checking the sensors. Therefore, keep the front cover and the housing cover closed during the sensor test.

➜ Press the Feed or Apply button to select the individual sensors (if present).

- For details refer to chapter Material end / Label sensors 🗋 on page 49.

➠ If the following message shows up, a communication error occured between the CPU board and the motor driver board belonging to the sensor:

```
Sensor test
No sensor found
```

## Sensors CPU board (64-xx)

| Sensor # | Sensor name | Description | Typical Value | Condition |
|---|---|---|---|---|
| 0.01 | Option | *64-xx dispenser only*: Dispense light barrier | 255 | Light barrier covered by a dispensed label |
| | | | 0 | Light barrier clear |
| 0.02 | Option | *64-xx dispenser only*: microswitch at the internal rewinder | 255 | Internal rewinder not full |
| | | | 0 | Internal rewinder full |
| 0.03 | Press | *64-xx dispenser only*: microswitch at the pressure roller | 255 | Pressure roller closed |
| | | | 0 | Pressure roller open |
| 0.04 | Matend | Material end light barrier | 0 | Without material (light barrier clear) |
| | | | 255 | With material inserted |
| 0.05 | Punch | Punch sensor | 7 to 10 | Without material (typical: 7) |
| | | | 11 to 255 | With material |
| 0.06 | Reflex | *Optional*: reflex sensor [a] | > 200 | Without material (approx. 253) or opposite of the reflex mark > 200) |
| | | | 10 bis 20 | With white material |
| 0.07 | FullSz | *Optional*: Full size light barrier | 10 | Without material |
| | | | 11 to 255 | With material |
| 0.09 | Cover | Hood switch | 0 | Hood closed |
| | | | 255 | Hood opened |
| 0.12 | H-Temp | Printhead temp. sensor | 105 to 235 | Displayed value drops when the printhead temp. rises (see tab. 3) |

*[Tab. 1] Test conditions for sensors connected to the CPU board.*

*a) Precondition: parameter „SYSTEM PARAMETER > Sens. punch LS“ = 30%*

## Sensors CPU board (DPM/PEM/ALX)

| Sensor # | Sensor name | Description | Typical Value | Condition |
|---|---|---|---|---|
| 0.03 | Press | Microswitch at the pressure roller contacting the feed roller | 255 | Pressure roller closed |
| | | | 0 | Pressure roller open |
| 0.04 | Matend | Material end light barrier | 0 | without material (light barrier clear) |
| | | | 255 | with material inserted |
| 0.05 | Punch | Punch sensor | 7 to 10 | without material (typical: 7) |
| | | | 11 to 255 | with material |
| 0.09 | Cover | Hood switch | 0 | Hood closed |
| | | | 255 | Hood opened |
| 0.12 | H-Temp | Printhead temp. sensor | 105 to 235 | Displayed value drops when the printhead temp. rises (see tab. 3) |

*[Tab. 2] Test conditions for sensors connected to the CPU board.*

## Value table for sensor 0.12 (printhead temp.)

| Sensor value | 235 | 230 | 225 | 220 | 215 | 210 | 205 | 200 | 195 | 190 | 185 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Printhead temp. | 12,9 | 17,8 | 22,1 | 26,0 | 29,5 | 32,7 | 35,8 | 38,7 | 41,4 | 44,0 | 46,6 |

*[Tab. 3] Sensor values of the print head temperature sensor (no. 0.12). The lower the displayed value is, the higher is the print head temperature.*

| Sensor value | 180 | 175 | 170 | 165 | 160 | 155 | 150 | 145 | 140 | 135 | 130 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Printhead temp. | 49,1 | 51,5 | 53,9 | 56,3 | 58,6 | 60,9 | 63,2 | 65,5 | 67,8 | 70,2 | 72,5 |

*[Tab. 4] tab. 3 continued.*

| Sensor value | 120 | 110 | 105 |
|---|---|---|---|
| Printhead temp. | 77,3 | 82,3 | 84,9 |

*[Tab. 5] tab. 4 continued.*

## Sensors output stage boards (64-xx)

| Sensor # | Sensor name | Description | Typical Value | Condition |
|---|---|---|---|---|
| 2.01 | Foil | Foil sensor | 0 | Sensor above a hole in the oscillator disc (light barrier clear) |
| | | | 254 | Sensor covered |
| 3.01 | Head | Light barrier at the printhead raising mechanism | 0 | Printhead in economy position (raised) |
| | | | 254 | Printhead in print position (lowered) |
| 4.01 | Option | Sensor for options (application for cutter, external rewinder or release motor sensor at the *64-xx dispenser*) | >10 | Light barrier covered |
| | | | <10 | Light barrier clear |

*[Tab. 6] Testbedingungen für Sensoren, die an eine der Endstufen-Platinen angeschlossen werden.*

## Sensors output stage boards (ALX/DPM/PEM)

| Sensor ID | Sensor-Name | Beschreibung | Typische Werte | Bedingung |
|---|---|---|---|---|
| 2.01 | Folie | Foil sensor | 0 | Sensor above a hole in the oscillator disc (light barrier clear) |
| | | | 254 | Sensor covered |
| 3.01 | Kopf | Light barrier at the printhead raising mechanism | 0 | Printhead in economy position (raised) |
| | | | 254 | Printhead in print position (lowered) |

*[Tab. 7] Testbedingungen für Sensoren, die an eine der Endstufen-Platinen angeschlossen werden.*